

**CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION**

ORDER NO. R2-2005-0026

**UPDATED WASTE DISCHARGE REQUIREMENTS
AND RESCISSION OF ORDER NO. 97-027 FOR:**

**FOR
CONOCOPHILLIPS COMPANY**

**SAN FRANCISCO REFINERY
1380 SAN PABLO AVE., RODEO, CA
CONTRA COSTA COUNTY**

TABLE OF CONTENTS

FINDINGS	5
Purpose of Order	5
Facility Location	5
Facility Description and Ownership	5
Regulatory History	7
Geologic Setting	8
Constituents of Concern	9
Summary of Groundwater Monitoring Areas	9
Surface Impoundments	9
Primary Storm Basin	9
Main Storm Basin	9
Inactive WMUs	9
Land Treatment Area	9
Inactive WMU-2 and WMU-3	10
Inactive WMU-4	10
Inactive WMU-5 and WMU-8	10
Inactive WMU-6, WMU-6A and WMU-6B	11
Inactive WMU-6C	11
Inactive WMU-7	12
Inactive WMU-9A and WMU-9B	12
Areas of Concern	12
Effluent Safety Basin	12
Unit 100 Waste Water Treatment Facility	13
Former PG&E Saltwater Intake	13
Former PG&E Saltwater Outfall Ditch	14
Gasoline Blending Unit 76 Area	14
Tank 302 and Well 181 Area	15
Interior Management	15
Former PG&E Oleum Power Plant	15
Biotreated Soils Area	16
Perimeter Monitoring	16
Groundwater Quality Program Objectives	16
Summary of Free-Phase Liquid Hydrocarbons Remediation Systems	17
Interceptor Trench	17
B-Zone Extraction System	17
Tank 302 Area Interceptor Trench and B-Zone Extraction System	18
PSB/MSB Extraction System	18
Unit 76 Active Skimmer System	19
Surface Water and Groundwater Treatment	19
Aboveground Petroleum Storage Tanks	19
Soils Management Plan	20
Basin Plan	21
Beneficial Uses of Surface Water and Groundwater	21

California Environmental Quality Act.....	22
Notifications and Meetings.....	22
PROHIBITIONS	22
SPECIFICATIONS	23
Reporting Specifications.....	23
Title 27 Compliance Specifications.....	24
Remediation Facility Maintenance Specifications.....	24
Remediation Facility Augmentation Specifications.....	25
Monitoring Specifications.....	25
Surface Impoundment Specifications.....	26
PROVISIONS	26
Compliance.....	26
Authority to Request Technical Reports.....	26
Reporting Requirements.....	26
Self-Monitoring Program.....	27
Revised Soils Management Plan.....	27
Report of Waste Discharge.....	27
Financial Assurance.....	27
Stormwater Control Plans.....	28
Availability.....	28
Change In Ownership.....	28
Revision.....	28
Submittal Revisions.....	28
Vested Rights.....	29
Severability.....	29
Operation and Maintenance.....	29
Reporting of Hazardous Substance Release.....	29
Releases.....	29
Entry and Inspection.....	30
Discharges To Navigable Waters.....	30
Change in Discharge.....	30
Monitoring Devices.....	31
Treatment.....	31
Endangerment of Health or the Environment.....	31
Document Distribution.....	32
General Prohibition.....	32
Earthquake Inspection.....	32
Maintenance of Records.....	32
Report Certification.....	32
Electronic Reporting.....	33
FIGURES	35
PART A	42
Authority and Purpose.....	42
Monitoring Requirements.....	42
Reporting Requirements.....	44
Annual Reporting.....	45

Contingency Reporting.....	47
Electronic Reporting.....	48
Maintenance of Written Records.....	49
PART B	50
Groundwater Monitoring.....	50
Surface Water, Stormwater and Wastewater Monitoring.....	50
Standard Observations.....	50
Facilities Monitoring.....	50
Frequency of Observations (Table B.1).....	51
Reporting Schedule (Table B.2).....	51
Groundwater Self-Monitoring Program.....	51
TABLES (Table 1 on Page 6).....	53
ACRONYM LIST	58

FINDINGS

The California Regional Water Quality Control Board, San Francisco Bay Region, (hereinafter called the Board) finds that:

PURPOSE OF ORDER

1. The purpose of this Order is to update the existing groundwater monitoring schedule and sampling parameters for the ConocoPhillips Company, San Francisco Refinery located in Rodeo, Contra Costa County (see Table 1 under Finding No. 11, and Table 3).
 - a. This Order provides status updates and specifies monitoring requirements for:
 - Two surface impoundments;
 - Eleven inactive WMUs;
 - Six contaminant areas of concern (AOC);
 - Two interior management areas; and
 - The area perimeter.
 - b. This Order provides status updates for:
 - The Biotreated Soils Area;
 - The groundwater extraction system; and
 - The Soils Management Plan.

On-going and future corrective action measures at the San Francisco Refinery are regulated by site cleanup requirements (SCRs) issued pursuant to the California Water Code (CWC), Section 13304.

FACILITY LOCATION

2. The San Francisco Refinery is located at 1380 San Pablo Avenue, Rodeo between the cities of Crockett (to the northeast) and Rodeo (to the south) (Fig.1). The terms "San Francisco Refinery", "refinery", "facility", and "site" are used interchangeably for the purpose of this Order.
3. The two most prominent topographic features at the refinery are Tormey Hill Ridge, which extends along the northeastern boundary, and the central valley that lies between Tormey Hill Ridge and lower hills to the southwest. The majority of the facility is constructed on the central valley. The northwestern boundary of the site is located along the shoreline of San Pablo Bay (Fig.2).
4. Approximately 95% of the area included within the refinery boundaries drains along the valley toward San Pablo Bay. A small amount of the total drainage flows northward into Cañada del Cierbo (Fig.2).
5. Interstate 80 bisects the site, with approximately 40% of the facility located west of the highway. The majority of the facility's petroleum storage tanks are located in this area, as well as inactive WMU Sites 2, 3, 4, 5, 8, and 6C, and the Biotreated Soils reuse area. The portion of the refinery east of I-80 is largely unutilized. It hosts eleven seasonal products storage tanks as well as inactive WMU Sites 6, 6A, 6B, 7, 9A, 9B, and the Land Treatment Area (LTA) (Fig.3 and Table 1).

FACILITY DESCRIPTION AND OWNERSHIP

6. ConocoPhillips Company, referred to herein as the Discharger, owns and operates the San Francisco Refinery, a petroleum refinery.

7. The San Francisco Refinery has undergone a number of ownership changes, which are summarized below:

Year	Owner/Operator
1896 to 1997	Unocal Corporation
1997 to 2001	Tosco Corporation
2001 to 2002	Phillips Petroleum
2002 to present	ConocoPhillips

8. In December 2003, ConocoPhillips purchased the former Pacific Gas and Electric (PG&E) Company Oleum Power Plant, located in the interior of the western side of the refinery (Fig.4). The PG&E Oleum Power Plant is part of the refinery and subject to this Order. PG&E maintains ownership of a small relay structure within the boundaries of the former Oleum Power Plant, not subject to this Order.
9. The San Francisco Refinery encompasses an area of approximately 1,100 acres. The facility operates approximately 100 above ground storage tanks, including four butane spheres and several industrial water tanks. The total maximum storage capacity is about 8,500,000 barrels (42 gallons/barrel). Daily crude throughput consists of approximately 73,000 barrels. (Fig.2 and Fig.3).
10. Refinery operations at this location began in 1896. Currently, the San Francisco Refinery receives crude oil and other feedstocks by vessels and pipelines. Refined products are delivered to customers via tanker barge, rail cars, trucks and pipelines. Crude oil is cracked and processed at the site to produce gasoline, diesel fuel, and jet fuel. Sulfur and petroleum coke are by-products. Lubricating oils and food grade waxes were once manufactured at this site, however the Discharger discontinued the production of these products in November 1997. Wastes generated from the refining and manufacturing processes were historically disposed of at various WMUs throughout the refinery or sent to off-site disposal facilities (Fig.4).
11. The Discharger is responsible for monitoring groundwater quality at active and inactive WMUs, several interior management locations, and the site perimeter. Many of these monitoring sites are also undergoing corrective action measures (e.g., groundwater extraction) (Table 1).

Table 1. Groundwater Monitoring and Extraction Areas

Site	Status	Location	Corrective Action	Figure
Primary Storm Basin*	Surface Impoundment / AOC*	southwest corner	yes	4
Main Storm Basin*	Surface Impoundment / AOC*	southwest corner	yes	4
WMU-4	Inactive WMU	central	no	4
WMU-5	Inactive WMU	west shoreline	yes	4
WMU-6	Inactive WMU	southeast corner	no	4
WMU-6A	Inactive WMU	southeast	no	4
WMU-6B	Inactive WMU	southeast	no	4
WMU-6C	Inactive WMU	south central	no	4
WMU-7	Inactive WMU	east corner	no	4
WMU-8	Inactive WMU	west shoreline	yes	4
WMU-9A	Inactive WMU	east perimeter	no	4
WMU-9B	Inactive WMU	east perimeter	no	4
Land Treatment Area	Inactive WMU	east central	no	4
Effluent Safety Basin	AOC	southwest corner	no	4

Unit 100 Wastewater Treatment Facility	AOC	southwest corner	yes	5
Former PG&E Intake	AOC	northwest shoreline	yes	3
Former PG&E Outfall	AOC	west shoreline	yes	3
Gas Blending Unit 76	AOC	south central	yes	3
Tank 302 / Well 181	AOC	northwest shoreline	yes	3
Former PG&E Power Plant	Interior	west central	no	4
Primary and Main Storm Basin Extr. System	Interior Extraction	southwest corner	yes	5
Unit 76 Active Skimmer	Interior Extraction	south central	yes	5
Extraction Trench	Perimeter Extraction	west shoreline	yes	5
B-Zone Extraction System	Perimeter Extraction	west shoreline	yes	5
Tank 302 Area Interceptor Trench and B-Zone Extr. System	Perimeter Extraction	northwest shoreline	yes	5
Perimeter Monitoring Wells**	Perimeter	north and west perimeter	yes**	6

* AOC discussion associated with the Primary and Main Storm Basins is included in the AOC section under the Unit 100 Waste Water Treatment Facility (pg.13).

** Perimeter wells along the west perimeter monitor the effectiveness of the perimeter extraction system.

REGULATORY HISTORY

12. Waste Discharge Requirements

The Board adopted Waste Discharge Requirements (WDR) Order No. 89-180 on December 13, 1989. Order No. 89-180 required the Discharger to:

- Further investigate the onsite WMUs;
- Undertake plume tracking at the Land Treatment Area;
- Investigate potential leakage from the Primary Storm Basin, Main Storm Basin and the Effluent Safety Basin;
- Detail the geology of the site;
- Increase perimeter monitoring and determine the extent of floating hydrocarbon pools found in the western part of the refinery, in close proximity to the San Pablo Bay shoreline.

On February 19, 1997, the Board adopted WDR Order No. 97-027. Order No. 97-027 required the Discharger to further investigate and remediate soil and groundwater at the site. This included enhancing the facility's groundwater containment system. Specifically, the Discharger was required to:

- Install above ground petroleum tank leak detection systems;
- Remove and contain contaminants in the B-Zone groundwater aquifer;
- Remediate Free-Phase Liquid Hydrocarbon (FPLH) in the Well 181/Tank 302 area;
- Remediate FPLH in the Gasoline Blending Unit 76 area;
- Remediate FPLH seeps in the stormwater discharge channel;
- Remediate FPLH in the EEI-29 well area;
- Implement a remediation plan and schedule for WMU Site 6C, and;
- Implement a Discharge Monitoring Program to monitor for releases from the WMUs.

13. Site Cleanup Requirements

The Board adopted Site Cleanup Order No. 93-046 on May 19, 1993 requiring the Discharger to:

- Prepare a corrective studies work plan to prevent migration of polluted groundwater into San Pablo Bay;
- Perform additional groundwater monitoring at the Seasonal Products Tank Farm;
- Develop a recovery system for floating hydrocarbons;
- Make an assessment of the acceptability of existing monitoring wells; and
- Install several additional groundwater wells.

14. National Pollutant Discharge Elimination System (NPDES) WDR

The Board adopted Board Order No. 00-015 (NPDES No. CA0005053) on March 15, 2000. This permit regulates the discharge of treated wastewater and stormwater runoff, and non-contact once through salt cooling waters from the Site.

GEOLOGIC SETTING

15. The refinery is located in a flat-floored valley formed within an east-west trending syncline. The axis of the syncline dips to the west towards San Pablo Bay. The formations of the northern limb dip almost vertically and the formations of the southern limb dip at an approximate 35 degree angle.

16. The general stratigraphic sequence of lithologic units underlying the site include:

- Fill;
- Bay mud;
- Bay sand; and
- Old Bay mud.

The distribution of these units influences the occurrence of groundwater aquifers at the facility. In some areas bay mud or bay sand are absent. There is also considerable spatial variation in the thickness of these units. The effectiveness of the groundwater quality monitoring program relies on an accurate understanding of the subsurface lithology for groundwater well placement.

17. The upper unconsolidated units (fill, Bay mud, Bay sand, and old Bay mud) overlay the nearly flat lying Montezuma Formation, which is composed of a series of estuarine and continental deposits. The Montezuma Formation overlies the downward warped consolidated Miocene San Pablo Group of sediments, which form a syncline. Geotechnical borings identified two major buried valleys beneath the bay front sediments. These two valleys are bayward extensions of the buried drainages which follow the synclinal axis of the San Pablo Group and lie beneath the Primary and Main Storm Basins and extend underneath the refinery's Effluent Safety Basin (Fig.3).
18. Coarse bay sand formed an elevated beach ridge in the area of present day San Pablo Avenue. West of the historic shoreline, in deeper Bay water, the beach sand graded to finer-grained sand. The bay front, previous to construction of the Southern Pacific Railroad, was an embayment created by the now buried stream discharges. The area bounded by current San Pablo Road, the railroad tracks, and the Effluent Safety Basin (Fig.3) is believed to have become a low-lying embayment or wetland when the railroad line was constructed in the mid-1800s, effectively cutting it off from the Bay. This low-lying area was filled with unknown fill material by the Discharger to bring it to grade (see Finding No.23.d. for land use details).
19. Groundwater south of the former PG&E saltwater outfall ditch (Fig.3) occurs from six to ten feet above mean sea level along most areas of the bay front, with a gradient towards San Pablo Bay. There are two water-bearing zones near the bay front. The upper water table is referred to as the A-zone, and the deeper water table is referred to as the B-zone. The A-zone aquifer is primarily located in fill and in Bay mud deposits, however it occurs in Bay sand where the Bay mud is absent. The lower B-zone aquifer occurs

below the bay mud in shallow surface drainages of the San Pablo Formation which hosts fine to very fine-grained Bay sand deposits varying in thickness from four to eight feet. This fine-grained sand extends towards the bay front. The fine-grained deeper Bay sand of the B-zone becomes finer and less hydraulically conductive near the bay front.

20. The main groundwater basin occurs below the axis of the syncline and has a groundwater gradient toward the northwest, draining into San Pablo Bay. The smaller Tormey groundwater basin is located northeast of the site along the Tormey Hill ridge, with a northeast groundwater gradient toward Cañada de Cierbo. The Tormey basin underlies a small portion of the upper tank farm (Fig.2 and Fig.3).

CONSTITUENTS OF CONCERN

21. The primary constituents of concern (COCs) at the refinery include various types of petroleum hydrocarbons and metals. Petroleum hydrocarbons (crude oil as well as different types of refined products and their derivatives) occur in both the dissolved phase and as free product. Metals (antimony, arsenic, barium, cadmium, chromium, lead, mercury, nickel, vanadium) are also present in groundwater at the site, with lead being the chief metal of concern. Minor amounts of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and aromatic volatile organic compounds (AVOCs) have also been detected in groundwater at some locations within the site.

SUMMARY OF GROUNDWATER MONITORING AREAS

22. **Surface Impoundments** (Fig.4 and Fig.5)

- a. **Primary Storm Basin (PSB)**

The PSB is located near the southwest corner of the refinery, immediately east of the refinery's Unit 100 wastewater treatment facility. It is concrete lined and has a capacity of 2.3 million gallons. The PSB receives a mixture of process wastewater and stormwater runoff when the storage capacity of the wastewater treatment plant and storm water aboveground tanks is exceeded.

The PSB is a permitted waste facility per State of California hazardous waste regulations.

- b. **Main Storm Basin (MSB)**

The MSB is located near the southwest corner of the refinery, immediately south of the refinery's Unit 100 wastewater treatment facility. The MSB has earthen sides and an earthen bottom, with a storage capacity of 7.2 million gallons. It receives stormwater runoff only when the capacity of the PSB is exceeded.

23. **Inactive WMUs** (Fig.4)

- a. **Land Treatment Area (LTA)** (Fig.4)

The LTA is located near the eastern perimeter of the refinery. Historically, it was used to dispose of biologically degradable refinery waste. The LTA has been closed and is maintained under a post closure permit issued by the Department of Toxic Substances Control (DTSC). Data indicates groundwater quality in the vicinity of the LTA is not affected downgradient or beneath the unit.

The DTSC permit conditions have historically included groundwater and vadose zone monitoring as well as routine maintenance and inspections. In Spring 2004 a new LTA permit was finalized. However, the most recent vadose zone soil and groundwater sampling event, conducted during June 2003, was completed per

conditions outlined in the new permit. The revised schedule includes future sampling events in June 2007, June 2011, June 2016, and June 2021.

b. **Inactive WMU-2 and WMU-3** (Fig.4)

Inactive WMUs 2 and 3 are located north of the upper tank farm, where the Groundwater Basin Divide separates the Refinery Groundwater Basin from the Tormey Hill Groundwater Basin (Fig.2). Both sites are located in the Tormey Hill groundwater basin. These sites were clean closed under the direction of the Department of Health Services. No contamination was found to migrate into Cañada Del Cierbo (Tormey Hill Groundwater Basin).

c. **Inactive WMU-4** (Fig.4)

Inactive WMU-4, located in the central portion of the refinery, was a 100-foot long pit used for disposal of leaded tank-bottom sludge before 1950. Conditions at the site were originally investigated during the 1988 Solid Waste Assessment Test (SWAT) Investigation. This investigation concluded that only total petroleum hydrocarbon (TPH) was present in the downgradient well. Groundwater sampling conducted during the 1992 Inactive Waste Sites Investigation did not detect TPH, but did identify arsenic in an upgradient well at concentrations slightly greater than the maximum contaminant levels (MCLs), and barium, cobalt, vanadium, zinc, molybdenum at concentrations slightly greater than detection limits, but below MCLs and comparable to concentrations in the upgradient well (MW-4-8). The 1992 and 1995 Groundwater Monitoring Program identified TPH and lead as COCs, concluding that additional testing for the other metals was not necessary. Therefore, metals other than lead are no longer included in parameters monitored in wells associated with WMU-4.

Groundwater data has been collected from wells adjacent to Inactive WMU-4 since Winter Quarter 1995. Dissolved lead has not been detected above method reporting limits since monitoring began in 1995. Additionally, TPH has rarely been detected in downgradient wells, with one recent occurrence at 0.13 mg/L (MW-4-8) in May 2001.

d. **Inactive WMU-5 and WMU-8** (Fig.4)

Inactive WMUs 5 and 8 are located adjacent to each other in close proximity to the San Pablo Bay shoreline. WMU-5 was used for disposal of leaded gasoline tank bottom sludges. WMU-8 was used for the disposal of acid sludge. The site has since been paved and is now a salvage area (Fig.3).

Waste constituents present in groundwater at this location are primarily petroleum hydrocarbons, metals, semivolatile and volatile organics, and acidic residues. Dissolved phase petroleum hydrocarbons have been detected in both the A and B groundwater zones and in downgradient perimeter wells. FPLH has also been identified in the vicinity of both WMU sites. Investigations have identified metals migrating downgradient from WMU-8. Arsenic (2.0 mg/L in MW-6; 10/15/03), barium (0.29 mg/L in MW-2B; 10/14/02), cadmium (0.10 mg/L in MW-6-DUP; 6/5/03), and chromium (0.089 mg/L in MW-6-DUP; 10/15/03) have been detected during recent monitoring events. Groundwater monitoring in the vicinity of WMU-5 and WMU-8 includes semi-annual testing for metals (As, Ba, Ca, Cr, and Pb), BTEX to identify the gasoline range hydrocarbon compounds, polynuclear aromatic hydrocarbons (PAHs) via the SVOC test to identify the extractable range hydrocarbons compounds, and pH. Groundwater contaminants are contained and removed by the Interceptor Trench (Alignments B and C), which is located approximately 100 to 150-ft to the west (Fig.5). A summary of the Interceptor Trench and its operation is included in Finding 28.a.

WMU-5 and WMU-8 are located within the former low-lying area bounded by San Pablo Road, the railroad tracks, and the ESB (see Finding No.18 of the Geologic Setting). Information collected when environmental investigations of the refinery began in the 1980's indicate this area, or a portion of thereof, was originally reclaimed by the pre-refinery owner (a local farmer) in the 1920's and 1930's for the family's personal use. The refinery acquired the low-lying area in the 1940's and began to bring it to grade using various fill material. The composition of the original fill is unknown, but is believed to have been primarily clean fill from refinery expansion projects. Other historical information suggests that the areas surrounding the present-day parking lot and salvage yard (Fig.3) were used during the 1940's and 1950's for general material and soil disposal, including burned debris and waste and excess equipment. However, the only distinct WMU areas identified during the Resource Conservation and Recovery Act (RCRA) facility investigation in this area were WMU-5 (leaded gasoline tank-bottom sludge disposal area) and WMU-8 (acid sludge pit).

e. Inactive WMU-6, WMU-6A and WMU-6B (Fig.4)

Inactive WMUs 6, 6A and 6B are located southeast of the plant site, south of Interstate I-80. These sites were used as disposal sites for refinery wastes. The Discharger conducted soils investigations in this area, and demonstrated that soil contamination rapidly decreases with depth at inactive WMUs 6 and 6B, and for most of inactive WMU-6A. Dredge spoils from the Effluent Safety Basin were buried beneath a portion of the waste deposits at inactive WMU-6A, and thus, oily waste materials extend several feet beneath ground surface at a portion of this waste site. Groundwater data has been collected from WMUs 6, 6A, and 6B wells since Winter Quarter 1995. There has been one recent occurrence of TPH-D (0.15 mg/L in MW-6A-1; 5/27/04), and one occurrence of toluene (1.8 µg/L) and xylenes (2.4 µg/L), both in well MW-6-35 on 5/23/01. Dissolved mercury has not been detected above method reporting limits at WMU-6 wells since monitoring began in 1995. No other groundwater samples indicate migration of wastes to the groundwater.

f. Inactive WMU-6C (Fig.4)

Inactive WMU-6C is located in the southeastern portion of the refinery, and underlies the Container Storage Unit (CSU) and Tanks 156 and 158. The Discharger submitted a December 1995 report entitled Final Reconnaissance Evaluation of the Areal Extent of Former Inactive Waste Unit 6C. According to report findings, petroleum hydrocarbon contaminated soils were found beneath the CSU during the CSU closure investigation. Evaluation of aerial photographs allowed for delineation of the WMU-6C boundaries. The 1995 report further concluded that the following contaminants were present **in soil** in the WMU-6C area:

- Coke waste
- TPH, as high as 11,000 mg/kg (Tank 109 area)
- Lead, as high as 1,900 mg/kg (Tank 109 area)
- Lead, average STLC of 24.74 mg/L (Soil Pile T2A)
- Mercury, in six of eight samples ranging from 0.17 to 2.0 mg/kg (CSU)
- TPH as motor oil, as high as 1500 mg/kg (CSU area)
- PCB (Poly Chlorinated Biphenyls) 1254, as high as 760 µg/kg (CSU area)
- Ten semivolatile organic compound (CSU area)

Groundwater data collection from wells in the vicinity of WMU-6C began in Summer Quarter 1997. In 1998, the Discharger completed a follow-up investigation that included the collection and analysis of additional soil borings and a review of historic data from 1995. The Discharger concluded that there are discrete, discontinuous layers of coke under the site. The discontinuous layers were found to be relatively

shallow and inert. In results from the 1998 sampling event, one sample out of twenty contained PCBs at concentrations above the method reporting. One additional groundwater monitoring well was installed (MW-211) within the WMU-6C area to monitor potential groundwater impacts. Three other monitoring wells are located upgradient and side-gradient from MW-211. Groundwater concentrations of contaminants at WMU-6C wells have generally been consistent during the previous four years of monitoring. No groundwater samples have contained PCBs at concentrations exceeding the method reporting limit. TPH is monitored annually, with SVOCs tested if TPH concentrations exceed 2.0 mg/L.

g. **Inactive WMU-7 (Fig.4)**

Inactive WMU-7 is located along the Tormey Hill Ridge, partially within the Tormey Hill groundwater basin just southeast of the seasonal product storage tanks on the southeast part of the site. It was used for the disposal of oily tank bottom sludges. Wells in the WMU-7 area are monitored for dissolved metals (arsenic, barium, chromium, lead, mercury) and SVOCs. Recent maximum concentrations include 0.035 mg/L arsenic (MW-7-26; 5/27/04), 0.23 mg/L barium (MW-7-26; 5/24/01), 0.0031 mg/L lead (MW-9A-1-DUP; 5/23/01), and 56 µg/L 1,2-Dichlorobenzene (MW-7-26; 5/27/04). There have been no recent detections of mercury, and dissolved chromium has not been detected above method reporting limits in WMU-7 wells since monitoring began in 1995.

h. **Inactive WMU-9A and WMU-9B (Fig.4)**

Inactive WMUs 9A and 9B are located on the southeast side of highway I-80. These WMUs were used for disposal of wastewater, primary treatment sludge, slop oil emulsion solids, and oily tank bottom sludges. Wastes were spread on the surface and tilled into the soil.

Groundwater data has been collected from WMU-9A and 9B wells since Winter Quarter 1995. Previous investigations identified a variety of metals in groundwater at WMU-9A at concentrations below their applicable MCLs and slightly above their detection limits. Recent maximum concentrations of detected metals include 0.0096 mg/L arsenic (MW-9A-1-DUP; 5/31/02), 0.034 mg/L barium (MW-9A-1-DUP; 6/2/03), and 0.061 mg/L lead (MW-9A-3; 5/30/02). Dissolved mercury and chromium have not been detected above method reporting limits in area wells since monitoring began in 1995. The 1992 Inactive Waste Sites Report noted one chromium detection of 0.051 µg/L in well MW-9B-3. TPH was detected above the method reporting limit once at a concentration of 0.084 mg/L (MW-9B-2; summer 1998). Recent maximum concentrations of VOCs and SVOCs occurred for toluene (1.1 µg/L) and xylenes (total) (1.1 µg/L), both in well MW-9B-2 (5/24/01), and for bis(2-ethylhexyl) phthalate (10 µg/L) in well MW-9A-1-DUP (5/23/01).

24. **Areas of Concern**

a. **Effluent Safety Basin (ESB) (Fig.3 and Fig.4)**

- i. The ESB is located in the southwestern corner of the refinery. The basin is approximately 250-ft wide, 450-ft long, and 4-inches deep, with earthen sides and bottom and a storage capacity of about 278,000 gallons. Flow through the ESB consists primarily of non-contact, once-through salt cooling water. A limited amount of fresh water may be added in the process units to supplement the salt cooling water as necessary. A small volume of wastewater from the main parking lot and from unit demineralizer regeneration processes contribute to the ESB flow. Surface water runoff from undeveloped areas of the refinery (non-process areas), the salvage yard, San Pablo Avenue, residential Rodeo, and a portion of I-80 enter Ditch 6, and merge with flow from the ESB. This combined

flow, which is regulated by the facility NPDES permit, discharges to San Pablo Bay at the E-003 outfall.

- ii. The ESB, Ditch 6, and the E-003 discharge channel and outfall are designed with a series of underflow weirs and absorbent booms to impart of margin of safety in the event of an unauthorized release. If an unauthorized release occurs, the existing weirs and booms would be enhanced before discharge to San Pablo Bay.
- iii. Groundwater data has been collected from the ESB wells since Winter Quarter 1995. Groundwater monitoring wells in the vicinity of the ESB contain dissolved and free phase petroleum hydrocarbons and elevated concentrations of arsenic (0.026 mg/L in MW-158; 10/13/03) and barium (4.1 mg/L in MW-22; 10/16/02). Dissolved chromium has not been detected above method reporting limits in ESB wells since monitoring began in 1995. Dissolved mercury was detected in one sample from ESB well MW-22 during Winter Quarter 1996 at a concentration of 0.007 mg/L, slightly above the reporting limit of 0.002 mg/L. Dissolved mercury has not been detected above method reporting limits in other samples collected from ESB wells.

b. Unit 100 Wastewater Treatment Facility (Fig.5)

- i. The Unit 100 wastewater treatment facility is located near the southwest corner of the refinery, adjacent to the PSB and MSB. In 1996, the Discharger completed a subsurface investigation along the northern perimeter of the MSB in response to petroleum hydrocarbon contamination in the vicinity. Petroleum hydrocarbon was present in groundwater wells and a petroleum seep at the north end of the MSB was visible along the bottom and sideslopes of the drainage channel that flows under San Pablo Avenue.
- ii. Results from the MSB 1996 investigation indicated that the area is contaminated with petroleum hydrocarbons. FPLH found in the PSB/MSB area is believed to be associated with historic handling of hydrocarbon mixtures in the early refinery wastewater treatment operations, and not with active releases from the current unit. Per investigation recommendations, the PSB/MSB Extraction System (described in detail in Finding No.28.d.) was installed in 1997. It consists of seven total fluid extraction wells to control FPLH in the Unit 100 Area.
- iii. Groundwater data has been collected quarterly from the PSB/MSB wells as part of the Groundwater Monitoring Program since Winter Quarter 1995. Groundwater wells in the vicinity of the PSB/MSB and Unit 100 contain dissolved and free phase petroleum hydrocarbons. Concentrations of dissolved arsenic and barium have historically fluctuated, with recent maximum concentrations of 0.095 mg/L arsenic (MW-9R; 10/0/03) and 0.42 mg/L barium (MW-24; 2/18/04) reported in wells adjacent to the two storm basins. However, the range of concentrations has generally been consistent and the fluctuations do not follow distinct seasonal trends. Dissolved chromium has not been detected above method reporting limits in PSB/MSB wells since monitoring began in 1995. Concentrations of AVOCs, methyl tertiary-butyl ether (MTBE), total petroleum hydrocarbons as diesel (TPH-D), and SVOCs, have either decreased or generally remained consistent.

c. Former PG&E Saltwater Intake (Fig.3)

- i. The former PG&E Saltwater Intake, located at the northwestern shoreline perimeter, was used to draw in once-through cooling water from San Pablo Bay. Water was directed to the PG&E Oleum Power Plant via a large diameter concrete intake tunnel. Although the power plant was shutdown by PG&E in the

mid 1980's, the abandoned tunnel remains, and runs under the western portion of the refinery. During the winter of 1994/1995, a petroleum hydrocarbon sheen was observed entering San Pablo Bay at the mouth of the abandoned tunnel. To prevent hydrocarbons from entering the Bay, the Discharger sealed the mouth of the tunnel with large steel plates and began recovering the accumulated product via a vacuum truck.

- ii. In 1995, the Discharger conducted a hydrogeologic assessment in the vicinity of the tunnel to determine the source of the hydrocarbons. This assessment concluded that product from historic releases was likely entering cracks in the tunnel in the portion of the tunnel above the water table near the tunnel mouth. Hydrocarbon accumulation is observed in the mouth of the tunnel primarily during the winter when the water table rises in response to the winter rains.
- iii. Due to low product recovery, the Discharger discontinued the use of vacuum trucks as the primary method of hydrocarbon removal (October 2000). The Discharger currently uses absorbent pads in conjunction with a vacuum truck as needed. Currently, a crew visits the site two to three times a week to replace absorbent pads and remove accumulated oil and/or water if a hydrocarbon sheen is present. In addition, the Refinery Operations Department visits the intake and outfall structures areas daily to inspect the quality of water in these areas and to determine whether separate phase hydrocarbons are present. The visits and observations are recorded in the Oil Recovery Log. If water in the area is impacted, the shift superintendent is responsible for initiating an immediate response.

d. Former PG&E Saltwater Outfall Ditch (Fig.3)

- i. The PG&E Saltwater Outfall Ditch runs through the refinery, west of San Pablo Ave. Historically, the outfall ditch was used to return once-through cooling water from the PG&E Oleum Power Plant to San Pablo Bay. The Discharger acquired the Outfall Ditch in December 2003 when the Oleum Power Plant property was purchased.
- ii. The Outfall Ditch has historically had petroleum hydrocarbon seeps. PG&E therefore installed sheet pile upgradient from the A-zone extraction trench to seal the outfall and prevent hydrocarbon discharge to the Bay. In addition, the pipe that extends beneath the railroad tracks, connecting the ditch to the Bay, was filled with concrete. Along most of its alignment the Outfall Ditch is relatively shallow, filled primarily with wetland vegetation. During the dry season, it contains little to no pooled water. During the wet season, water accumulates and a pump is used to transfer water in the ditch to the Unit 100 treatment facility (Fig.5). Close to the western terminus of the ditch, there is an exposed trench-like opening in which standing water is generally present. Portions of the water surface as well as the surface of former wooden piers show a visible hydrocarbon sheen.
- iii. In 1997, the Discharger completed a site investigation to evaluate potential remediation strategies for the PG&E Outfall Ditch area. Based on the study findings, the Discharger determined that the amount of accumulated product was too small to warrant installation of an active or passive skimming system. The Discharger operates the interceptor trench and extraction wells to control FPLH and dissolved hydrocarbons in impacted groundwater. The facility Operations Team inspects the area daily and pumps are used to transfer the water in the outfall ditch to the refinery sewer system, which is routed to the Unit 100 treatment facility (Fig.5). In addition, a vacuum truck crew visits the site as needed to place/replace absorbent pads and remove accumulated product.

e. Gasoline Blending Unit 76 Area (Fig.5)

- i. Gasoline Blending Unit 76 is located in the south central area of the refinery. A historic release occurred east of Unit 76 in the early 1970's when Tank 695 was overfilled with gasoline. As a result, FPLH was released to groundwater. The current remediation system consists of three groundwater extraction wells, referred to as the Unit 76 Active Skimmer System. The system was designed in 1997 with the goal of initiating recovery of FPLH that had been noted in the three area wells for several years. Recovered FPLH is conveyed from each active skimmer via aboveground lines to a double contained 150-gallon storage tank where it is collected, until removal by vacuum truck twice per week. Product thickness in each well is monitored approximately one to two times a week. A summary of the system and its operation is included in Finding 28.e.

f. Tank 302 and Well 181 Area (Fig.5)

- i. This portion of the refinery, located near the northwestern perimeter, is leased from the State Lands Commission and is subject to this Order (Fig.2). Elevated total petroleum hydrocarbon concentrations were observed in monitoring well MW-181 during historic quarterly groundwater monitoring events. In November 1995, the Discharger conducted a hydrogeological assessment of the soil and groundwater in the vicinity of groundwater monitoring well MW-181. Results from the study suggested the source was due to historic releases that occurred east of the Southern Pacific Railroad tracks. Residual petroleum hydrocarbon concentrations in soil ranged from non-detect to 100,000 mg/kg. Total petroleum hydrocarbons were present in both A-zone and B-zone wells near Tank 302 in concentrations ranging from 0.3 mg/L to 16 mg/L. Well MW-181 contained 0.01 feet of free phase hydrocarbon and was not sampled.
- ii. In 1997, the Discharger submitted a remediation work plan to address the presence of free product in Well 181 (Tank 302 area). This area is located north of the original four segments of A-zone extraction trench system, which became operational in 1995. Per recommendations made in the remediation work plan, an additional trench segment (Segment E) was installed north of the original system and became operational in 2001. In addition, three B-zone extraction wells were installed. The additional trench segment and B-Zone wells are known as the Tank 302 Area Interceptor Trench and B-Zone Extraction System. A summary of the system and its operation is included in Finding 28.c.

25. Interior Management

a. Former PG&E Oleum Power Plant (Fig.3)

- i. The Discharger acquired the former PG&E Oleum Power Plant in December 2003. Environmental studies at the former Power Plant area conducted in 1999-2000 included installing thirteen monitoring wells and collecting/chemically testing groundwater samples. Groundwater data indicate the presence of TPH, VOCs, and metals in most site wells. PAHs were detected in two wells and PCBs were detected in one well.
- ii. The former power plant site is located upgradient from several existing groundwater monitoring wells and groundwater parameters downgradient from the power plant area have been historically monitored. However, as part of the land transfer, area-specific sampling and chemical testing have been established for area wells. Based on information provided in the July 21, 2004 Proposal – Revised Groundwater Quality Monitoring Program and preliminary data presented in the Spring Quarter 2004 groundwater monitoring event, groundwater sampling in this area will include:

- Semi-annual gauging and sampling at six wells, including the four wells along the downgradient edge of the area and two upgradient wells that have historically contained petroleum hydrocarbons;
- Annual well gauging and sampling at three additional upgradient wells; and
- Annual water level gauging at four wells, including three interior wells and one well that is outside the former power plant site property.

b. Biotreated Soils Area (Fig.4)

- i. The Biotreated Soils Area, located southeast of Inactive WMU-4, was developed as a laydown site in 1990 for soils that had been biotreated. The biotreatment area was located in the current day site of tanks 112 and 109, about 500 feet south of WMU-4. Biotreatment consisted of placing site-derived low-level diesel contaminated soil on top of clean sand ("drying beds"), then piping air through the sand and soil to enhance biodegradation. When petroleum hydrocarbon concentrations were less than 100 mg/kg, the soil was moved to the Biotreated Soils Area. With the adoption of a refinery Soils Management Plan in 1997 (see Findings 30 - 33), a portion of the Biotreated Soils Area, referred to as Fill Area B, was identified as a designated soil reuse site. Soils added to Fill Area B since 1997 have also included *site-derived* soils that meet the reuse criteria of the Soil Management Plan. By definition, soils that are acceptable for reuse at this area do not pose a threat to groundwater, and monitoring to date indicates that the reuse criteria are protective of groundwater quality.
- ii. In 1991, three groundwater monitoring wells were constructed in the soil reuse area, including one upgradient well (MW-140A1) and two downgradient wells (MW-141 and MW-142A). Ten years of groundwater quality monitoring at the two downgradient wells indicate mostly non-detectable (<0.050 mg/L) concentrations of TPH, including not detect values for each sampling event since Fall 1999. The only exceptions were results from Spring 1999, which included TPH in the 1 to 2.5 mg/L range at the two downgradient wells. These results have not been confirmed in subsequent sampling events and are not believed to be representative of actual site groundwater quality. Samples of groundwater from the upgradient monitoring well (well MW-140A1) contained TPH in the 0.1 to 0.5 mg/L range in 1998 and early 1999, but have not contained detectable TPH since the Fall 1999 event. Data confirm that the reuse of biotreated soils has not impaired groundwater quality in this area. Per the requirements of this Order, updates to the facility's groundwater monitoring program include discontinuing groundwater monitoring for the three wells associated with the Biotreated Soils Area.

26. Perimeter Monitoring (Fig.5)

The groundwater sampling network at the refinery includes 43 perimeter wells that are sampled on a semi-annual basis. These wells, located along the northern and western boundaries, are used to monitor water quality along the perimeter both upgradient and downgradient from the site. Sampling parameters for perimeter monitoring wells and for wells located within the interior of the site are designed to monitor for the presence of COCs based on historic land use as well as trends in water quality data.

GROUNDWATER QUALITY PROGRAM OBJECTIVES

27. The objectives of the groundwater quality program are to:

- a. Monitor and contain off-site contamination migration pathways located near the perimeter of the refinery;
- b. Monitor areas of concern in the interior of the refinery where corrective action measures are in place (e.g., areas of known releases, areas of downgradient

hydrocarbon accumulation, and areas in the vicinity of aboveground storage tanks with a history of bottom repairs); and

- c. Monitor site surface impoundments and WMUs.

SUMMARY OF FREE-PHASE LIQUID HYDROCARBONS REMEDIATION SYSTEMS

28. Five operating systems control groundwater and/or recover FPLH within the San Francisco Refinery (Fig.5):

- Interceptor Trench
- B-Zone Extraction System
- Tank 302 Area Interceptor Trench and B-Zone Extraction System
- Primary and Main Storm Basin (PSB/MSB) Extraction System
- Unit 76 Active Skimmer FPLH Recovery System

These systems were implemented as part of the overall Groundwater Quality Management Program for the refinery. The Interceptor Trench, B-Zone Extraction System, and Tank 302 Area System hydraulically control groundwater near the downgradient perimeter of the refinery. The PSB and MSB extraction system and Unit 76 Active Skimmer FPLH Recovery System mitigate interior “hot spots”. The components and effectiveness of each operating system are discussed below.

a. Interceptor Trench (Fig.5)

The Interceptor Trench is designed to capture contaminated groundwater and FPLH within the A-Zone aquifer from migrating into San Pablo Bay. The trench is constructed along approximately 3000 feet of the property boundary near the present-day Bay shore (Refinery Groundwater Basin Perimeter). The trench captures shallow groundwater along its length by keeping the water level in the trench approximately one to five feet below the regional groundwater level. The main portion of the trench was built in 1994/1995 and brought online in 1996. The trench includes four segments (Alignments “A” through “D”), and is tied into topographically elevated basement rocks at each end to prevent groundwater from flowing around the trench terminals. The interceptor trench includes 15 total fluids extraction sumps (S-1 through S-15) spaced at approximately 200-foot intervals. The trench segments are connected by a common effluent conveyance line that transfers collected fluids to a 250-gallon surge tank. Fluid in the tank is pumped in batches to a drop inlet connected to the refinery’s wastewater system, which is routed to the Unit 100 wastewater treatment facility. A fifth trench segment (Alignment E), with five extraction sumps (ES-1 through ES-5) spaced at approximately 125-foot intervals, was built in 1998 in the Tank 302 Area. This trench segment is part of the Tank 302 Area Interceptor Trench described below. The extraction sumps are equipped with pneumatically operated total fluid withdrawal pumps, which are of the canister (autopump) or double diaphragm style.

b. B-Zone Extraction System (Fig.5)

The Discharger conducted an investigation of the influence the perimeter extraction trench has on B-Zone groundwater between the PG&E Saltwater Outfall and the ESB. The investigation concluded the following:

- The A-Zone groundwater is hydraulically separated from the B-Zone groundwater, although the two to six foot aquitard is considered leaky.
- The perimeter extraction trench does not impart a significant hydraulic influence on B-Zone groundwater. B-Zone groundwater is not contained or collected by the A-Zone trench.
- Volatile and semi-volatile organic compounds have been detected in five B-Zone wells.

- Trace amounts (<0.03 feet) of free phase product were detected in two B-Zone wells.
- Groundwater modeling of the B-Zone indicated that extraction from the five existing B-Zone wells located between the "B" and "C" trench alignment will provide hydrodynamic containment and collection of the pollutants.

The Discharger installed a B-Zone recovery system. The B-Zone Extraction System consists of six B-Zone extraction wells (MW-200 through MW-204, installed in early 1997, and MW-215, installed in Spring 2001). The wells are located along the western Refinery Groundwater Basin Perimeter between the PG&E Saltwater Outfall Ditch and ESB E-003 discharge channel (Fig.3), and were installed to hydraulically control off-site groundwater migration in the deeper water-bearing zone. The B-Zone Extraction System effluent is piped into the same conveyance line as the Interceptor Trench. The extraction pumps in each well are also pneumatically operated total fluid withdrawal pumps, which are of the canister (autopump) or double diaphragm style.

The B-Zone Extraction System controls groundwater in the Inactive WMU 5 and 8 Area, typically producing up to ten feet of drawdown in the extraction wells and one to three feet of drawdown in the upgradient monitoring wells.

During 2003, the combined Interceptor Trench and B-Zone Extraction System removed approximately 4.6 million gallons of fluids, corresponding to an average flowrate of 8.7 gallons per minute (gpm). Quarterly estimates of the percent FPLH in the total fluids have ranged from 0.1 to 1.0 percent.

c. Tank 302 Area Interceptor Trench and B-Zone Extraction System (Fig.5)

The Tank 302 system is an extension of the Interceptor Trench and B-Zone Extraction System. The system includes an interceptor trench segment (Alignment E) with five extraction sumps (ES-1 through ES-5) and three B-Zone extraction wells (MW-212, MW-213, and MW-214). The pumps in the trench extraction sumps and wells are pneumatically operated total fluid withdrawal pumps, which are of the canister (autopump) or double diaphragm style. A common pipeline conveys the effluent to the SFR wastewater system. The Tank 302 Area System was installed during Summer Quarter 1998 and brought online in September 1998. During 2003, the system removed approximately 400,000 gallons, corresponding to an average flowrate of 0.75 gpm. Estimates of the percent FPLH in the total fluids have ranged from approximately 0.1 to 0.5 percent.

The Tank 302 system induces groundwater capture in this area of the Site. Water levels in the shallow groundwater zone along the trench typically exhibit approximately one to four feet of drawdown, with groundwater flow beneath the majority of the area moving toward the trench. B-Zone groundwater drawdown is generally maintained in the desired range of two to ten feet, with groundwater flow toward each extraction well. When effective groundwater drawdown is maintained by the system, the Tank 302 Area trench and B-Zone extraction wells induce capture in the groundwater zones several hundred feet inland.

d. PSB/MSB Extraction System (Fig.5)

The PSB/MSB Extraction System is a total fluids recovery system designed to remove FPLH from the subsurface and hydraulically control the flow of groundwater from the wastewater treatment plant area. The system includes extraction wells MW-205 through MW-210 located adjacent to the northwestern side of the MSB and MW-23 located adjacent to the western edge of the MSB. The system was installed during Fall Quarter 1997, and started operation in January 1998.

The PSB/MSB extraction system has historically been effective at removing contaminated groundwater and recovering FPLH. During 2003, the system removed approximately 6.0 million gallons of total fluids, corresponding to an average flowrate of 11 gpm. FPLH has historically been present in five of the seven extraction wells (MW-205 through MW-209). However, normal operation of the PSB/MSB Extraction System routinely controls the FPLH in these wells, with thicknesses generally being maintained at a sheen or very thin accumulation. Estimates of the percent FPLH in the extracted fluids have historically ranged from 0.1 to 0.6 percent.

The PSB/MSB Extraction System creates a groundwater depression along the axis of the extraction wells, and a reversal of groundwater flow up to 300 feet downgradient of the extraction wells. The system induces groundwater capture in the PSB/MSB Area by depressing groundwater elevation in the main portions of the PSB/MSB that have been known to contain FPLH. In addition, the extraction system depresses groundwater elevations and captures groundwater from the adjacent drainage ditch where FPLH seeps were previously observed.

e. **Unit 76 Active Skimmer System (Fig.5)**

The Unit 76 Active Skimmer System was installed in October 1998 to recover FPLH in the vicinity of the gas blending unit. The system includes three wells (MW-132, MW-134, and MW-186) fitted with product-only skimmers and pneumatic double-diaphragm or bladder pumps. The effluent from the wells is conveyed to a 150-gallon recovery tank, which is purged twice per week by vacuum truck. The system typically maintains FPLH in the three wells to a thickness of less than three inches. Approximately 3,400 gallons of FPLH were removed by the system in 2003.

SURFACE WATER AND GROUNDWATER TREATMENT

29. Surface water (stormwater) from the process areas of the refinery and extracted groundwater are routed to the refinery's Unit 100 wastewater treatment facility via the site's sewer system. Water that passes through the Unit 100 facility is treated, then released at the refinery's deepwater outfall, which is regulated by the facility's NPDES permit. The Unit 100 facility is located in a topographically low area of the refinery, adjacent to the PSB and MSB (Fig.5). In addition, the site groundwater gradient is generally toward the Unit 100 area. The relatively low elevation of the area makes it a logically feasible location to route the refinery sewer systems and process waste. Surface water runoff from undeveloped areas of the refinery (non-process areas), the salvage yard, San Pablo Ave., part of residential Rodeo, and a portion of I-80 flows through a channel that passes around the southern edge of the Unit 100 area. The channel merges with flow from the ESB, where it is routed to the E-003 outfall and discharged to San Pablo Bay (Fig.3). Water collected in the channel is separate from refinery stormwater.

ABOVEGROUND PETROLEUM STORAGE TANKS

30. The Discharger operates approximately 100 aboveground storage tanks. Of those, approximately 80 contain petroleum as defined by the Aboveground Petroleum Storage Act (APSA). The total maximum petroleum storage capacity is about 7,800,000 barrels (42 gallons/barrel). The tanks are required to comply with the requirements of Chapter 6.67, Aboveground Storage of Petroleum Health and Safety Code §25270 - 25270.13, and with Part 112, Title 40 of the Federal Code of Regulations (Oil Pollution Prevention). The Discharger has instituted a program to upgrade the regulated tanks with leak detection bottoms. The majority of regulated tanks have been upgraded, with the remaining 16 tanks scheduled for upgrade by November 2017 to fulfill the requirements of the APSA.

SOILS MANAGEMENT PLAN

31. The Discharger submitted two technical reports (February 1996, Facility Wide Soils Management Plan, and October 1996, Technical Memorandum -Soils Management Plan Addendum), which addressed the reuse of site-derived low-level petroleum contaminated soils at the refinery and included the Biotreated Soils Area as an approved soil reuse area under the refinery's Soil Management Plan. Water Board staff approved these reports in October 1996.

The current Soils Management Plan was developed when the Discharger requested to apply a prior soils plan that had been developed for the Reformulated Fuels Tankage Characterization Project to general soils reuse.

The soil reuse criteria developed as part of that effort were based on a three-step process:

- a. Identifying the compounds and concentrations that would allow a soil volume to be determined to be nonhazardous;
- b. Identifying the primary risk-driving compounds known to be (or potentially present) in soil at this facility, and calculating health-protective concentrations limits; and
- c. Assembling a cumulative waste/risk compound list, and setting the lower (more conservative) concentration value as the screening criteria.

Concentrations for determining a designated waste were typically the published total threshold limit values for hazardous wastes, adjusted by a 1.5 protection factor for additional conservatism. The appropriate "risk-driver" compounds were developed from a toxicity assessment of the known and probable compounds in contaminated soil at the refinery, and selecting representative and protective indicator compounds. The health-protective concentration limits (CLs) for these compounds were back-calculated based on a site-specific exposure assessment that considered the two most likely exposure scenarios for the facility (indoor office and outdoor production workers), and target risks of 1.0E-05 (carcinogenic toxicity) and 1.0 (noncarcinogenic hazard index). Exposure pathways considered for each scenario included incidental ingestion, dermal contact, inhalation of particulate from surface soils, and inhalation of VOCs volatilizing from surface or subsurface soils

32. The Discharger submitted a Soils Management Plan Addendum dated October 12, 1996, which was approved by Water Board staff. The October 1996 Addendum proposed a risk assessment approach for evaluating cumulative cancer risk to onsite workers.
33. The Discharger submitted a Soils Management Plan Addendum dated May 17, 2002, which was approved by Water Board staff. Because refinery soils containing petroleum hydrocarbons are often associated with a larger range of PAHs than were considered in the original Soils Management Plan, the Discharger expanded the list of carcinogenic and non-carcinogenic PAHs to better assess the suitability of soils for on-site reuse.
34. The current approved Soils Management Plan and the two in-place, approved addendums, call for the following chemical testing of representative soil samples:

Phase I Chemical Testing

- Benzene, toluene, ethylbenzene, and xylene (BTEX) by Environmental Protection Agency (EPA) Method 8021B
- Total lead by EPA Method 6010B

- PAHs by EPA method 8270C

Carcinogenic PAHs

benzo(a)anthracene
benzo(a)pyrene
benzo(b)fluoranthene
benzo(k)fluoranthene
chrysene
dibenz(a,h)anthracene
indeno(1,2,3-cd)pyrene

Non-carcinogenic

acenaphthene
acenaphthylene
anthracene
benzo(g,h,i)perylene
fluorene
fluoranthene
2-methylanaphthylene
naphthylene
phenanthrene
pyrene

Phase II Chemical Testing (as needed, based on the results of the Phase I tests)

- Leachable lead by the California Assessment Metals (CAM) Waste Extraction Test (WET) Method and/or the EPA Toxicity Characteristic Leaching Procedure (TCLP)
- Leachable benzene by TCLP

BASIN PLAN

35. The Board adopted a revised Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) on January 21, 2004. This updated and consolidated plan represents the Board's master water quality control planning document. The revised Basin Plan was approved by the State Water Resources Control Board and the Office of Administrative Law on July 22, 2004, and October 4, 2004, respectively, and approved by the U.S. Environmental Protection Agency, Region IX on January 5, 2005. A summary of regulatory provisions is contained in 23 CCR 3912. The Basin Plan defines beneficial uses and water quality objectives for waters of the State, including surface waters and groundwaters.
36. The Basin Plan provides that all groundwaters are considered suitable, or potentially suitable, for municipal or domestic water supply (MUN) and that, in making any exceptions, the Board will consider the criteria referenced in Board Resolution No. 89-39, "Sources of Drinking Water", where:
 - a. The total dissolved solids exceed 3,000 mg/l (5,000 μ S/cm, electrical conductivity), and it is not reasonably expected by the Board that the groundwater could supply a public water system;
 - b. There is contamination, either by natural processes or human activity (unrelated to the specific pollution incident), that cannot reasonably be treated for domestic use using best management practices or best economically achievable treatment practices; and
 - c. The water source does not provide sufficient water to supply a single well capable of producing an average, sustained yield of 200 gallons per day.

BENEFICIAL USES OF SURFACE WATER AND GROUNDWATER

The existing and potential beneficial uses of surface water for San Pablo Bay and groundwater under and in the vicinity of the San Francisco Refinery are:

37. Surface Water
 - a. Estuarine habitat;
 - b. Wildlife habitat;
 - c. Fish spawning;
 - d. Fish migration;
 - e. Preservation of rare and endangered species;
 - f. Ocean, commercial and sport fishing;
 - g. Industrial Service Supply;
 - h. Navigation;
 - i. Water contact recreation;
 - j. Non-water contact recreation; and
 - k. Shellfish Harvesting.
38. Groundwater
 - a. Municipal and domestic water supply; and
 - b. Industrial process and service water supply.

CALIFORNIA ENVIRONMENTAL QUALITY ACT

39. This action relates to permitting existing WMUs and is thus categorically exempt from the provision of the California Environmental Quality Act pursuant to Section 15301, Title 14 of the California Code of Regulations.

NOTIFICATIONS AND MEETINGS

40. The Water Board has notified the Discharger and interested agencies and persons of its intent to update waste discharge requirements for the site and has provided interested parties with an opportunity to submit written views and recommendations.
41. The Board in a public hearing heard and considered all comments pertaining to the proposed waste discharge requirements for the site.

IT IS HEREBY ORDERED pursuant to the authority in Section 13263 of the California Water Code (CWC), Title 27, Division 2, Subdivision 1 of the California Code of Regulations (27CCR), and Chapter 15, Division 3, Title 23 of the California Code of Regulations (Title 27) that the Discharger, its agents, successors, and assigns shall meet the applicable provisions contained in Title 27 and Division 7 CWC, and shall comply with the following:

PROHIBITIONS

1. Migration of pollutants through subsurface transport to waters of the State is prohibited.
2. There shall be no discharge of wastes to surface waters except as permitted under the National Pollutant Discharge Elimination System.
3. The treatment, discharge or storage of materials which may impact the beneficial uses of groundwater or surface water shall not be allowed to create a condition of pollution or nuisance as defined in Sections 13050 (l) and (m), respectively, of the CWC, nor degrade the quality of waters of the State or of the United States.
4. The creation of any new WMU is prohibited without prior Board staff written concurrence.
5. The relocation of wastes is prohibited without prior Board staff written concurrence.

6. The relocation of wastes to or from WMUs shall not create a condition of pollution or nuisance as defined in Section 13050 (l) and (m) CWC. Any relocated waste shall not be placed in or allowed to contact ponded water from any source whatsoever. Wastes shall not be relocated to any location where they can be discharged into waters of the State or of the United States.
7. Excavation within or reconfiguration of any existing WMU is prohibited without prior concurrence of Board staff. Minor excavation or reconfiguration activities such as for installation of signs or minor landscaping, or for minor routine maintenance and repair do not require prior staff concurrence.
8. Waste shall not be exposed at the surface of any WMU.
9. Disking of WMU covers is prohibited without prior Board staff written concurrence. Alternate methods of controlling vegetative growth, which do not affect the integrity of the WMU cap, are preferred.
10. Surface drainage from tributary areas and internal site drainage from surface or subsurface sources shall not contact or percolate through wastes during the life of the site.
11. The discharge of hazardous waste at the facility is prohibited. For the purpose of this Order, the term hazardous waste is as defined in Title 23, Article 2 of Chapter 15.
12. Activities associated with subsurface investigations and cleanup that will cause significant adverse migration of pollutants are prohibited.
13. The Discharger **shall not** cause the following conditions to exist in waters of the State at any place outside the waste management facility:
 - a. Surface Waters
 - i. Floating, suspended, or deposited macroscopic particulate matter or foam;
 - ii. Bottom deposits or aquatic growth;
 - iii. Alteration of temperature, turbidity, or apparent color beyond natural background levels;
 - iv. Visible, floating, suspended or deposited oil or other products of petroleum origin; or
 - v. Toxic or other deleterious substances to be present in concentrations or quantities which may cause deleterious effects on aquatic biota, wildlife or waterfowl, or which render any of these unfit for human consumption either at levels created in the receiving waters or as a result of biological concentrations.
 - b. Groundwater
 - i. Further degradation of groundwater quality and/or substantial worsening of existing groundwater impacts;
 - ii. Further significant migration of pollutants through subsurface transport.

SPECIFICATIONS

Reporting Specifications

1. All reports submitted pursuant to this Order shall be prepared under the supervision of and signed by a California registered civil engineer, registered geologist, and/or certified engineering geologist.
2. The Discharger shall implement Corrective Action Programs, pursuant to 27CCR, Section 20430 to remediate releases from WMUs and to achieve compliance with the

Water Quality Protection Standards (WQPS) established by the Board. The WQPS include the following:

- a. The list of COCs established for the WMUs includes all organic and inorganic compounds identified in this Order, and in the SMP attached to this Order, or any future amendments thereof;
 - b. The Discharger shall propose CLs for all COCs detected at the specified points of compliance. CLs must be based on evaluation of background concentrations for each COC, pursuant to 27 CCR, Section 20400; and
 - c. A Point of Compliance (POC) exists at every location along the perimeter of the WMU where waste exists. The POC extends vertically through the uppermost aquifer beneath the landfill. Each monitoring well and sampling point located along the downgradient WMU perimeter, specified in this Order or the attached SMP to this Order, or any future amendments thereof, shall represent a POC.
3. At any time, the Discharger may file a written request (including supporting documentation) with the Executive Officer, proposing modifications to the attached SMP. If the proposed modifications are acceptable, the Executive Officer may issue a letter of approval that incorporates the proposed revisions into the SMP.

Title 27 Compliance Specifications

4. Final cover systems for WMUs shall be graded and maintained to promote lateral runoff and prevent ponding and infiltration of water.
5. The Discharger shall notify the Board immediately of any failure that threatens the integrity of any containment and/or control facilities, structures, or devices. Any such failure shall be promptly corrected after approval of the method and schedule by the Executive Officer.
6. The Discharger shall maintain the WMUs so as to prevent a statistically significant increase in water quality parameters at points of compliance as provided in 27CCR, Section 20420.
7. The Discharger shall maintain the waste units to prevent discharges, such that the units do not constitute a pollution source.
8. The Board considers the property owner and site operator to have continuing responsibility for correcting any problems, which arise in the future as a result of waste discharge or related operations or site use.
9. The Discharger shall comply with all applicable provisions of Title 27 that apply to the closure and post-closure of WMUs and the design and maintenance of surface impoundments.
10. WMUs shall be closed according to a closure plan prepared according to all applicable requirements of Title 27, and approved by the Executive Officer.

Remediation Facility Maintenance Specifications

11. The Discharger shall **annually demonstrate** (include results in the Annual Report) that all installed groundwater remedial systems including, but not limited to, groundwater containment, treatment, and/or extraction systems are functioning as intended and designed.
12. Containment, collection, drainage, and monitoring systems at the facility, shall be maintained as long as contaminated waste, soil, or water is present and poses a threat to water quality.

13. The Discharger shall maintain groundwater or remediation devices or design features installed in accordance with this Order such that they continue to operate as intended without interruption, with the exception of periodic maintenance.

Remediation Facility Augmentation Specifications

14. If the Executive Officer determines the existence of an imminent threat to the beneficial uses of surface or subsurface waters of the State, the Discharger may be required to install additional groundwater monitoring wells and/or undertake corrective action measures, including submittal of a site investigation report.
15. The Discharger shall install any additional groundwater and leachate monitoring devices required to fulfill the terms of any future SMP issued by the Executive Officer.
16. The Discharger shall install, maintain in good working order, and operate efficiently any facility, alarm, groundwater extraction system, or hydraulic/contaminant migration control system necessary to assure compliance with these Waste Discharge Requirements.
17. If it is determined by the Executive Officer, based on groundwater monitoring information, that water quality impairment immediately outside the boundary of any WMU continues to degrade, the Discharger will be required to submit and implement a site specific groundwater corrective action proposal.

Monitoring Specifications

18. The Discharger shall conduct monitoring activities according to the SMP attached to this Order and as may be amended by the Executive Officer, to verify the effectiveness of groundwater remediation and containment systems and WMU closure systems.
19. Should monitoring results show evidence of plume migration, additional plume characterization of pollutant extent shall be required.
20. The Discharger shall provide reasonable access to any property they own or lease at the site to allow for installation, sampling, monitoring, etc., of all devices and equipment necessary for compliance with the requirements of this Order.
21. The Discharger shall submit photographic documentation of any soil or groundwater corrective action features installed at the facility, and of any petroleum spill, which is required to be reported. A map shall be provided which identifies the location of any petroleum spill.
22. All monitoring wells shall be constructed in a manner that maintains the integrity of the drill hole, prevents cross-contamination of saturated zones, and produces representative groundwater samples from discrete zones within the groundwater zone each well is intended to monitor.
23. All borings for monitoring wells shall be continuously cored. The drill holes shall be logged during drilling under the direct supervision of a registered geologist whose signature appears on the corresponding well log. Logs of monitoring wells shall be filed with the Department of Water Resources. All information used to construct the wells shall be submitted to the Board upon completion of the wells.
24. The groundwater sampling and analysis program shall ensure that groundwater quality data are representative of the groundwater in the area that is monitored.
25. The Discharger shall monitor the perimeter of the facility for COCs, which are derived from each unit and within each perimeter area segment. If established Trigger Levels are exceeded at the perimeter, corrective action at the interior and the perimeter shall be required.

26. The Discharger shall monitor for all COCs **once every five years** and for each Monitoring Parameter (subset of COCs) at intervals determined in the SMP. The next all-inclusive COC monitoring events shall be completed September of 2007, 2012, 2017, and 2022.
27. In the event of a release of a COC at a concentration greater than the Trigger Levels beyond the Perimeter Compliance Point (Perimeter Segment) or evidence of plume instability detected at an interior POC, the Discharger shall notify the Board and evaluate the need for corrective action.

Surface Impoundment Specifications

28. If it is determined by the Executive Officer that any surface impoundment is degrading beneficial uses, there shall be no discharges to a surface impoundment, and residual liquids and sludges shall be removed expeditiously.
29. The impoundments will be operated such that scouring at points of discharge and by wave action at the water line will not degrade the pond containment features.
30. Pipeline discharge to surface impoundments shall be either equipped with devices, or fail-safe operating procedures, to prevent overfilling. The surface impoundments shall always maintain at least two-feet of freeboard.
31. Discharger shall operate the surface impoundments according to a detailed operating, maintenance, and contingency plan, which will include at a minimum, procedures for routine inspection of the surface impoundments, discharge into a pond, discharge out of a pond, contingency measures if problems with the containment structures are found, and notification of agencies.

PROVISIONS

1. Compliance

The Discharger shall comply immediately, or as prescribed by the time schedule below, with all Prohibitions, Specifications, and Provisions of this Order. All required submittals must be acceptable to the Executive Officer. The Discharger must also comply with all conditions of these Waste Discharge Requirements. Violations may result in enforcement actions, including Water Board Orders or court Orders requiring corrective action or imposing civil monetary liability, or in modification or revocation of these Waste Discharge Requirements by the Board. [CWC Section 13261, 13262, 13265, 13267, 13268, 13300, 13301, 13304, 13350].

2. Authority to Request Technical Reports

All technical and monitoring reports required by this Order are requested pursuant to Section 13267 of the CWC. Failure to submit reports in accordance with schedules established by this Order or failure to submit a report of sufficient technical quality to be acceptable to the Executive Officer may subject the Discharger to enforcement action pursuant to Section 13268 of the CWC.

3. Reporting Requirements

Technical reports/plans submitted by the Discharger, in compliance with the Prohibitions, Specifications, and Provisions of this Order shall be submitted to the Board on the schedule specified herein. These reports/plans shall consist of a letter report that includes the following:

- a. Identification of any obstacles that may threaten compliance with the schedule;

- b. In the event of non-compliance with a Prohibition, Specification, or Provision of this Order, written notification which clarifies the reasons for non-compliance and which proposes specific measures and a schedule to achieve compliance. The written notification shall identify work not completed that was projected for completion, and shall identify the impact of non-compliance on achieving compliance with the remaining requirements of this Order; and
- c. In the self-monitoring reports (see Part B), an evaluation of the current groundwater monitoring system and a proposal for modifications as appropriate.

4. Self-Monitoring Program

The Discharger shall comply with the Self-Monitoring Program (SMP) attached to this Order (Part A and Part B) and as may be amended by the Executive Officer. The attached SMP is intended to constitute a Detection Monitoring Program (DMP) pursuant to Title 27, Section 20420 and is designed to identify significant water quality impacts from the specified WMU and demonstrate compliance with the WQPS established pursuant to Title 27, Section 20390 for the WMU. The attached SMP may be amended as necessary at the discretion of the Executive Officer.

Due Date: Immediate

5. Revised Soils Management Plan

The Discharger shall submit a revised Soils Management Plan, acceptable to the Executive Officer. The revised Plan shall address two key elements:

- a. Consideration of current risk-based criteria.

The science of toxicology has progressed beyond the surrogate method used in the original Soils Management Plan. There are now published risk-based values for the different hydrocarbon fractions, and ethylbenzene has recently been re-classified by EPA Region 9 as a possible human carcinogen.

- b. Consideration of guidance regarding the reuse of site-derived petroleum impacted soils.

The Water Board has developed guidance on the reuse of site-derived petroleum impacted soils, and Environmental Screening Levels (ESLs) that are based on human-health and ecological risk management for BTEX, PAHs, hydrocarbon fractions, and metals.

A copy of the Revised Soils Management Plan shall be provided to the Contra Costa Health Services, Hazardous Materials Programs.

Due Date: September 15, 2005

6. Report of Waste Discharge

The Discharger shall submit a technical report, acceptable to the Executive Officer, describing any proposed material change in the character, location, or volume of a discharge, or in the event of a proposed change in use or development of a WMU or landfill [CWC Section 13260(c)]. The technical report shall describe the project, identify key changes to the design that may impact any portion of the WMU or landfill, and specify components of the design necessary to maintain integrity of the WMU or landfill cover and prevent water quality impacts.

Due Date: 120 days prior to any material change

7. Financial Assurance

The Discharger shall submit to this Board evidence of an Irrevocable Post-closure Fund acceptable to the Executive Officer, to ensure monitoring, maintenance, and any necessary remediation actions. Every five years, for the duration of the post-closure monitoring period, the Discharger shall submit a report that includes an outline of the

financial assurance mechanism and verification that the fund has been created. The fund value shall be supported by calculations, to be included with this submittal, providing cost estimates for all post-closure monitoring, maintenance, repair and replacement of WMU or landfill containment, cover, and monitoring systems. Additionally, cost estimates must be provided for any future corrective action measures that may be required for all WMUs at the facility. The fund value shall be based on the sum of these estimates. The cost estimates and funding shall be updated to reflect change to monitoring systems as they occur. The post-closure maintenance period shall extend as long as the wastes within the WMU pose a threat to water quality.

Due Date: Submitted with Annual Report, then every five years thereafter

8. **Stormwater Control Plans**

For each grading or development project proposed greater than one acre in size, where stormwater runoff is not captured in the facility wastewater collection system and fully treated by Unit 100, the Discharger shall submit a Notice of Intent to the State Water Resources Control Board, submit a Storm Water Pollution Prevention Plan acceptable to the Executive Officer, and implement Best Management Practices (BMPs) for the control of stormwater, in accordance with requirements specified in the State Water Resources Control Board General Permit for Storm Water Discharges Associated with Construction Activities (Order No. 99-08-DWQ; NPDES Permit No. CAS000002). The Discharger will be deemed in compliance with this provision if another party constructing improvements on property owned by the Discharger, pursuant to an easement granted by the Discharger, has obtained coverage under the General Permit.

Due Date: 30 days prior to construction

9. **Availability**

A copy of these waste discharge requirements shall be maintained by the Discharger and shall be made available by the Discharger to all employees or contractors performing work (maintenance, monitoring, repair, construction, etc.) at WMUs or groundwater containment systems. [CWC Section 13263]

10. **Change In Ownership**

In the event of any change in control or ownership of the facility presently owned or controlled by the Discharger, the Discharger shall notify the succeeding owner or operator of the existence of this Order by letter, a copy of which shall be forwarded to the Water Board upon a final change in ownership.

To assume operation of this Order, the succeeding owner or operator must apply in writing to the Executive Officer requesting transfer of this Order within 30 days of the change of ownership. The request must contain the requesting entity's full legal name, mailing address, electronic address, and telephone number of the persons responsible for contact with the Board. Failure to submit the request shall be considered a discharge without requirements, a violation of the CWC. [CWC Sections 13267 and 13263]

Due Date: 30 days after a change in facility control or ownership

11. **Revision**

These waste discharge requirements are subject to review and revision by the Water Board. [CCR Section 13263]

12. **Submittal Revisions**

Where a Discharger becomes aware that it failed to submit any relevant facts in a Report of Waste Discharge or submitted incorrect information in a Report of Waste Discharge or in any report to the Water Board, it shall promptly submit such facts or information. [CWC Sections 13260 and 13267]

13. Vested Rights

This Order does not convey any property rights of any sort or any exclusive privileges. The requirements prescribed herein do not authorize the commission of any act causing injury to persons or property, do not protect the Discharger from liability under Federal, State or local laws, nor do they create a vested right for the Discharger to continue the waste discharge. [CWC Section 13263(g)]

14. Severability

Provisions of these waste discharge requirements are severable. If any provisions of these requirements are found invalid, the remainder of these requirements shall not be affected. [CWC 9213]

15. Operation and Maintenance

The Discharger shall, at all times, properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Discharger to achieve compliance with conditions of this Order. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls including appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of this order. [CWC Section 13263(f)]

16. Reporting of Hazardous Substance Release

If any hazardous substance is discharged in or on any waters of the State, or discharged or deposited where it is, or probably will be, discharged in or on any waters of the State, the Discharger shall report such discharge to the Water Board by calling (510) 622-2300 during regular office hours (Monday through Friday, 8:00 to 5:00). A written report shall be filed with the Water Board within five working days. The report shall include the following components:

- a. Nature of the waste or pollutant;
- b. Estimate of the quantity involved;
- c. Approximate rate of overflow;
- d. Duration of incident;
- e. Cause of the release;
- f. Estimated size of affected area;
- g. Corrective measures that have been taken or planned, and a schedule of these measures;
- h. Nature of effects (e.g., pertinent observations, analyses, etc.);
- i. Persons/agencies notified;
- j. Map showing the location(s) of any spill, seepage, or dike rupture;
- k. Photographs of the impacted area as soon as possible after the discharge; and
- l. Photographs of the impacted area at the completion of clean up (these photographs may be supplied following submittal of the Release Report if cleanup requires more than five working days).

17. Releases

Except for a discharge which is in compliance with these waste discharge requirements, any person who, without regard to intent or negligence, causes or permits any hazardous substance or sewage to be discharged in or on any waters of the State, or discharged or deposited where it is, or probably will be, discharged in or on any waters

of the State, shall immediately notify the Office of Emergency Services (OES) of the discharge in accordance with the spill reporting provision of the state toxic disaster contingency plan adopted pursuant to Article 3.7 (commencing with Section 8574.7) of Chapter 7 of Division 1 of Title 2 of the Government Code, and immediately notify the State Water Board or the appropriate Regional Water Board of the discharge as soon as:

- a. That person has knowledge of the discharge;
- b. Notification is possible; and
- c. Notification can be provided without substantially impeding cleanup or other emergency measures.

This provision does not require reporting of any discharge of less than a reportable quantity as provided for under subdivisions (f) and (g) of Section 13271 of the Water Code unless the Discharger is in violation of a prohibition in the applicable water Quality Control Plan. [CWC Section 13271(a)]

18. Entry and Inspection

The Discharger shall allow the Water Board, or an authorized representative upon the presentation of credentials and other documents as may be required by law, to:

- a. Enter upon the Discharger's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this Order;
- b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order;
- c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order; and
- d. Sample or monitor at reasonable times, for the purposes of assuring compliance with this order or as otherwise authorized by the CWC, any substances or parameters at any location. [CWC Section 13267]

19. Discharges To Navigable Waters

Any person discharging or proposing to discharge to navigable waters from a point source (except for discharge of dredged or fill material subject to Section 404 of the Clean Water Act and discharge subject to a general NPDES permit) must file an NPDES permit application with the Water Board. [CCR Title 2 Section 22357]

20. Change in Discharge

In the event of a material change in the character, location, or volume of a discharge, the Discharger shall file with this Regional Water Board a new Report of Waste Discharge. [CWC Section 13260I]. A material change includes, but is not limited to, the following:

- a. Addition of a major industrial waste discharge to discharge of essentially domestic sewage, or the addition of a new process or product by an industrial facility resulting in a change in the character of the waste;
- b. Significant change in disposal method, e.g., change from a land disposal to a direct discharge to water, or change in the method of treatment which would significantly alter the characteristics of the waste;
- c. Significant change in the disposal area, e.g., moving the discharge to another drainage area, to a different water body, or to a disposal area significantly removed from the original area potentially causing different water quality or nuisance problems;
- d. Increase in flow beyond that specified in the waste discharge requirements; and/or

- e. Increase in area or depth to be used for solid waste disposal beyond that specified in the waste discharge requirements. [CCR Title 23 Section 2210]

21. Monitoring Devices

All monitoring instruments and devices used by the Discharger to fulfill the prescribed monitoring program shall be properly maintained and calibrated as necessary to ensure their continued accuracy. All flow measurement devices shall be calibrated at least once per year, or more frequently, to ensure continued accuracy of the devices. Annually, the Discharger shall submit to the Executive Officer a written statement signed by a registered professional engineer certifying that all flow measurement devices have been calibrated and will reliably achieve the accuracy required.

Unless otherwise permitted by the Water Board Executive Officer, all analyses shall be conducted at a laboratory certified for such analyses by the State Department of Health Services. The Water Board Executive Officer may allow use of an uncertified laboratory under exceptional circumstances, such as when the closest laboratory to the monitoring location is outside the State boundaries and therefore not subject to certification. All analyses shall be required to be conducted in accordance with the latest edition of "Guidelines Establishing Test Procedures for Analysis of Pollutants" (40 CFR Part 136) promulgated by the U.S. Environmental Protection Agency. [CCR Title 23, Section 2230]

22. Treatment

In an enforcement action, it shall not be a defense for the Discharger that it would have been necessary to halt or to reduce the permitted activity in order to maintain compliance with this Order. Upon reduction, loss, or failure of the treatment facility, the Discharger shall, to the extent necessary to maintain compliance with this Order, control production or all discharges, or both, until the facility is restored or an alternative method of treatment is provided. This provision applies, for example, when the primary source of power of the treatment facility fails, is reduced, or is lost. [CWC Section 13263(f)]

23. Endangerment of Health or the Environment

The Discharger shall report any noncompliance that may endanger health or the environment. Any such information shall be provided orally to the Executive Officer, or an authorized representative, within 24 hours from the time the Discharger becomes aware of the circumstances. A written submission to the Water Board shall also be provided within five business days of the time a Discharger becomes aware of the circumstances. The written submission shall contain:

- a. A description of the noncompliance and its cause;
- b. The period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected; and
- c. The anticipated time it is expected to continue and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.
- d. The Executive Officer, or an authorized representative, may waive the written report on a case-by-case basis if the oral report has been received within 24 hours. The following occurrences must be reported to the Executive Officer within 24 hours:
- e. Any bypass from any portion of the treatment facility;
- f. Any discharge of industrial products, leachate, or treated or untreated wastewater; and
- g. Any treatment plant upset which causes the discharge limitation(s) of this Order to be exceeded. [CWC Sections 13263 and 13267]

24. Document Distribution

Copies of all correspondence, technical reports, and other documents pertaining to compliance with this Order shall be provided to the following agencies:

- a. San Francisco Bay Regional Water Quality Control Board (all submittals);
- b. Department of Toxic Substances Control (all submittals); and
- c. Contra Costa Health Services, Hazardous Materials Programs (Soils Management Plan only).

The Executive Officer may modify this distribution list as needed.

25. General Prohibition

Neither the treatment nor the discharge of waste shall create a pollution, contamination or nuisance, as defined by Section 13050 of the CWC. [H&SC Section 5411, CWC Section 13263]

26. Earthquake Inspection

Discharger shall submit a detailed Post Earthquake Inspection Report acceptable to the Executive Officer, in the event of any earthquake generating ground shaking of Richter Magnitude 7 or greater at or within 30 miles of the facility. The report shall describe the containment features, groundwater monitoring, and control facilities potentially impacted by the static and seismic deformations of any WMU or groundwater containment system. Damage to any waste containment facility, which may impact State waters, must be reported immediately to the Executive Officer.

Due Date: Within two weeks of earthquake

27. Maintenance of Records

The Discharger shall retain records of all monitoring information including all calibration and maintenance records, all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this order. Records shall be maintained for a minimum of five years from the date of the sample, measurement, report, or application. This period may be extended during the course of any unresolved litigation regarding this discharge or when requested by the Water Board Executive Officer.

Records of monitoring information shall include:

- a. The date, exact place, and time of sampling or measurements;
- b. The individuals who performed the sampling or measurements;
- c. The date(s) analyses were performed;
- d. The individuals who performed the analyses;
- e. The analytical techniques or method used; and
- f. The results of such analyses.

28. Report Certification

All application reports or information to be submitted to the Executive Officer shall be signed and certified as follows:

- For a corporation – by a principal Executive Officer or the level of vice president.
- For a partnership or sole proprietorship – by a general partner or the proprietor, respectively.
- For a municipality, state, federal, or other public agency – by either a principal Executive Officer or ranking elected official.

A duly authorized representative of a person designated in this provision may sign documents if all of the following are met:

- a. The authorization is made in writing by a person described in paragraph (a) of this provision;
- b. The authorization specifies either an individual or position having responsibility for the overall operation of the regulated facility or activity; and
- c. The written authorization is submitted to the Executive Officer.

Any person signing a document under this Section shall make the following certification: "I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment." [CWC Sections 13263, 13267, and 13268]

29. **Electronic Reporting**

a. **Geotracker Requirements**

The State Board recently adopted regulations requiring electronic report and data submittal to Geotracker. The text of the regulations can be found at the following URL:

http://www.waterboards.ca.gov/ust/cleanup/electronic_reporting/docs/final_electronic_regs_dec04.pdf

Starting July 1, 2005, parties responsible for cleanup of pollution at sites overseen by the Regional Water Board's Land Disposal Programs are required to submit over the internet, the following information electronically:

- i. Groundwater analytical data;
- ii. Surveyed locations of monitoring wells;
- iii. Boring logs describing monitoring well construction; and
- iv. Portable data format (PDF) copies of all reports (the document, in its entirety [signature pages, text, figures, tables, etc.] must be saved as a single PDF file).

Note that the Discharger is still responsible for submitting **one hard copy** of all reports pursuant to this Order. Individual Regional Water Boards may require direct submittal of electronic reports and correspondence in addition to the State Board's Geotracker requirements.

b. **Electronic Data Tables**

Upon request, monitoring results shall also be provided electronically in Microsoft Excel® or similar spreadsheet format to provide an easy to review chronological summary of site data, and to facilitate data computations and/or plotting that Water Board staff may undertake during the review process. Data tables submitted in electronic spreadsheet format will not be included in the case file for public review and should therefore be submitted on CD or diskette and included with the print report. Electronic tables shall include the following information:

- i. Well designations;
- ii. Well location coordinates (latitude and longitude);
- iii. Well construction (including top of well casing elevation, total well depth, screen interval depth below ground surface, and screen interval elevation);
- iv. Groundwater depths and elevations (water levels);
- v. Phase-separated product thicknesses and elevations;
- vi. Current analytical results by constituent of concern (including detection limits for each constituent);

- vii. Historical analytical results (including the past five years unless otherwise requested); and
 - viii. Measurement dates.
30. This Order supersedes and rescinds Order No. 97-027.
31. This Order is subject to Board review and updating, as necessary, to comply with changing State or Federal laws, regulations or policies, or guidelines; changes in the Boards Basin Plan; or changes in discharge characteristics.

I, Bruce H. Wolfe, Executive Officer, do hereby certify that the foregoing is a full, complete, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on June 15, 2005.

Bruce H. Wolfe
Executive Officer

Attachments:

- 1. Figure 1. Vicinity Map
- 2. Figure 2. Site Aerial Map
- 3. Figure 3. Site Plan
- 4. Figure 4. Surface Impoundments, Inactive Waste Management Units, and Effluent Safety Basin Map
- 5. Figure 5. Hydrocarbon Remediation Systems
- 6. Figure 6. Perimeter Monitoring Wells
- 7. Self-Monitoring Program (Part A, Part B)
- 8. Table 2. Groundwater Self-Monitoring Program Summary by Quarter
- 9. Table 3. Groundwater Self-Monitoring Program Sampling Parameters
- 10. Table 4. Acronym List

Figure 1. Vicinity Map (figure based on “Vicinity Map” from MWH Site Monitoring Reports)

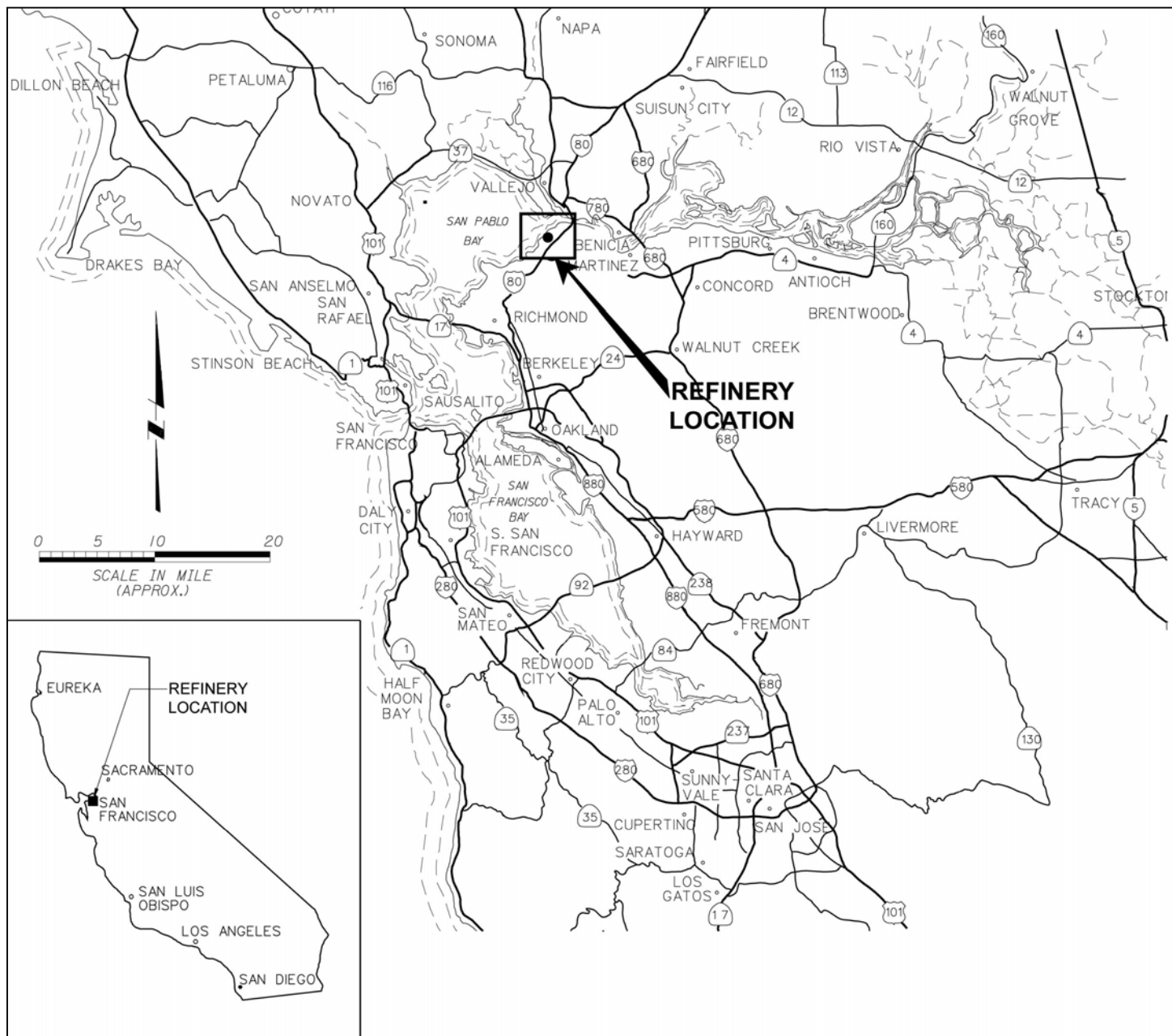


Figure 2.
Site Aerial Map (aerial map based on ConocoPhillips meeting handout; topographic map based on figure generated using TOPO! program)



Figure 3. Site Plan (figure based on “Site Plan” map from MWH Site Monitoring Reports)

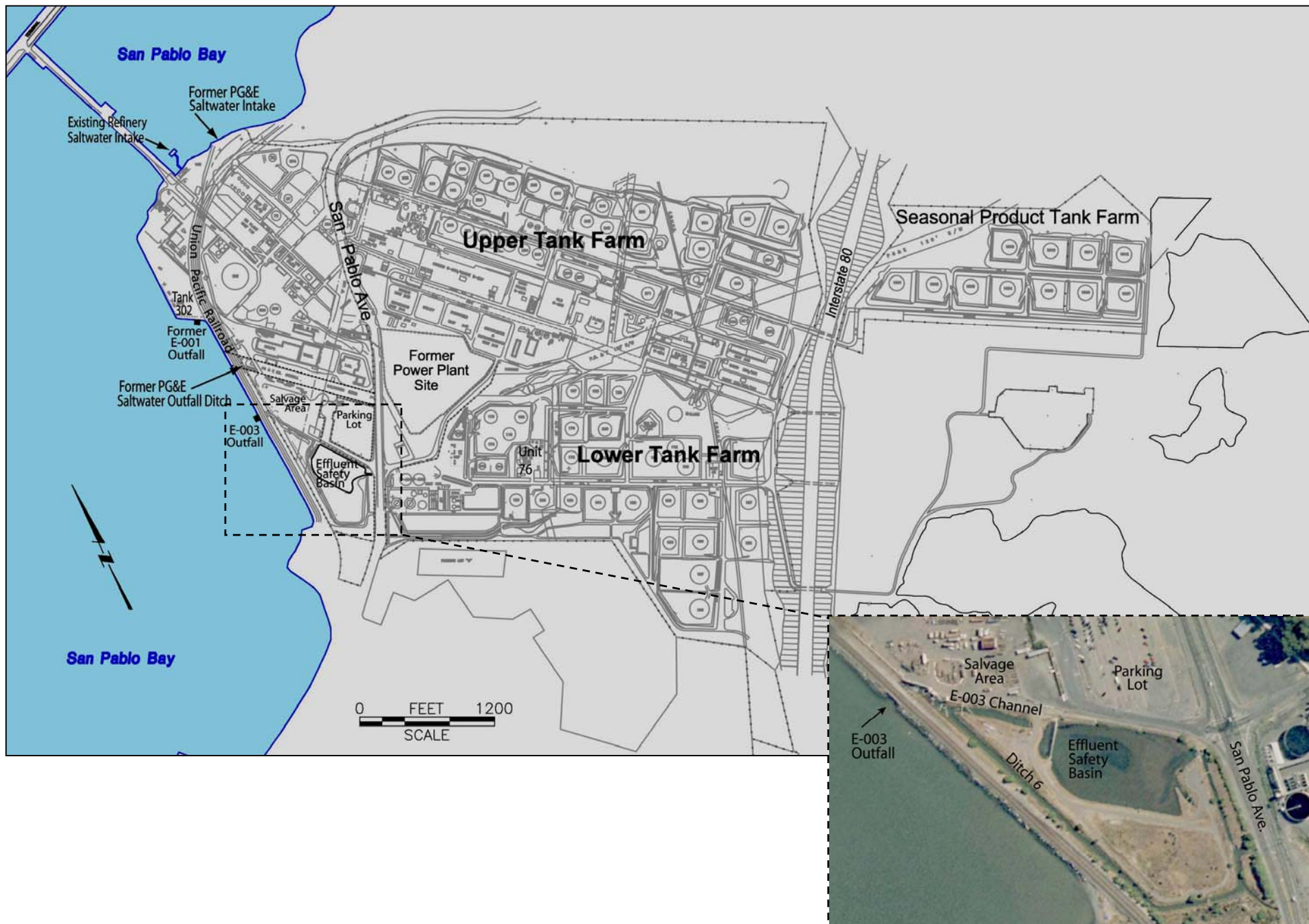


Figure 4. Surface Impoundments, Inactive Waste Management Units (WMU), and Effluent Safety Basin
(figure based on "Site Plan" map from MWH Site Monitoring Reports)

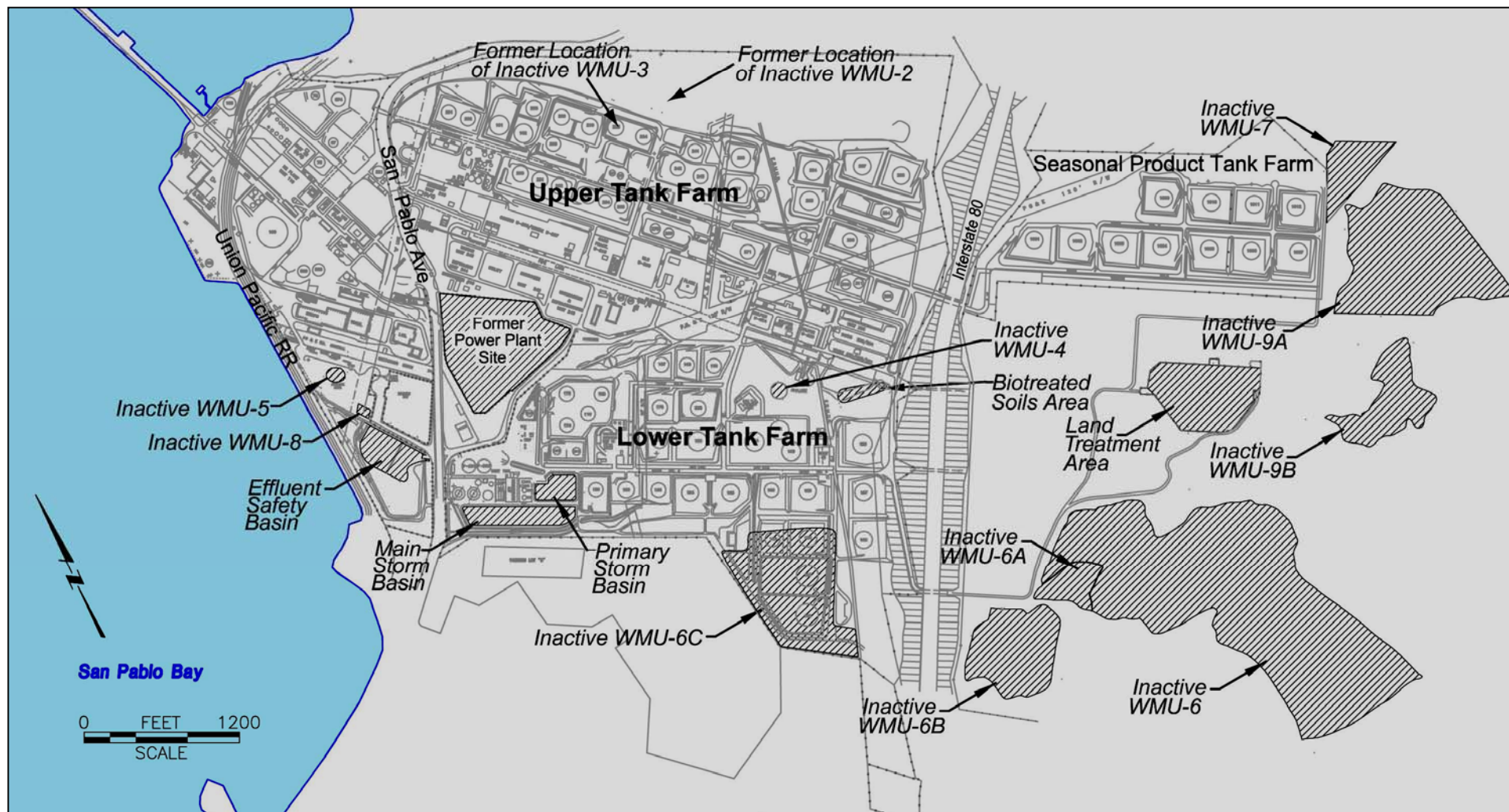


Figure 5. Hydrocarbon Remediation Systems (figure based on "Site Plan" map from MWH Site Monitoring Reports)

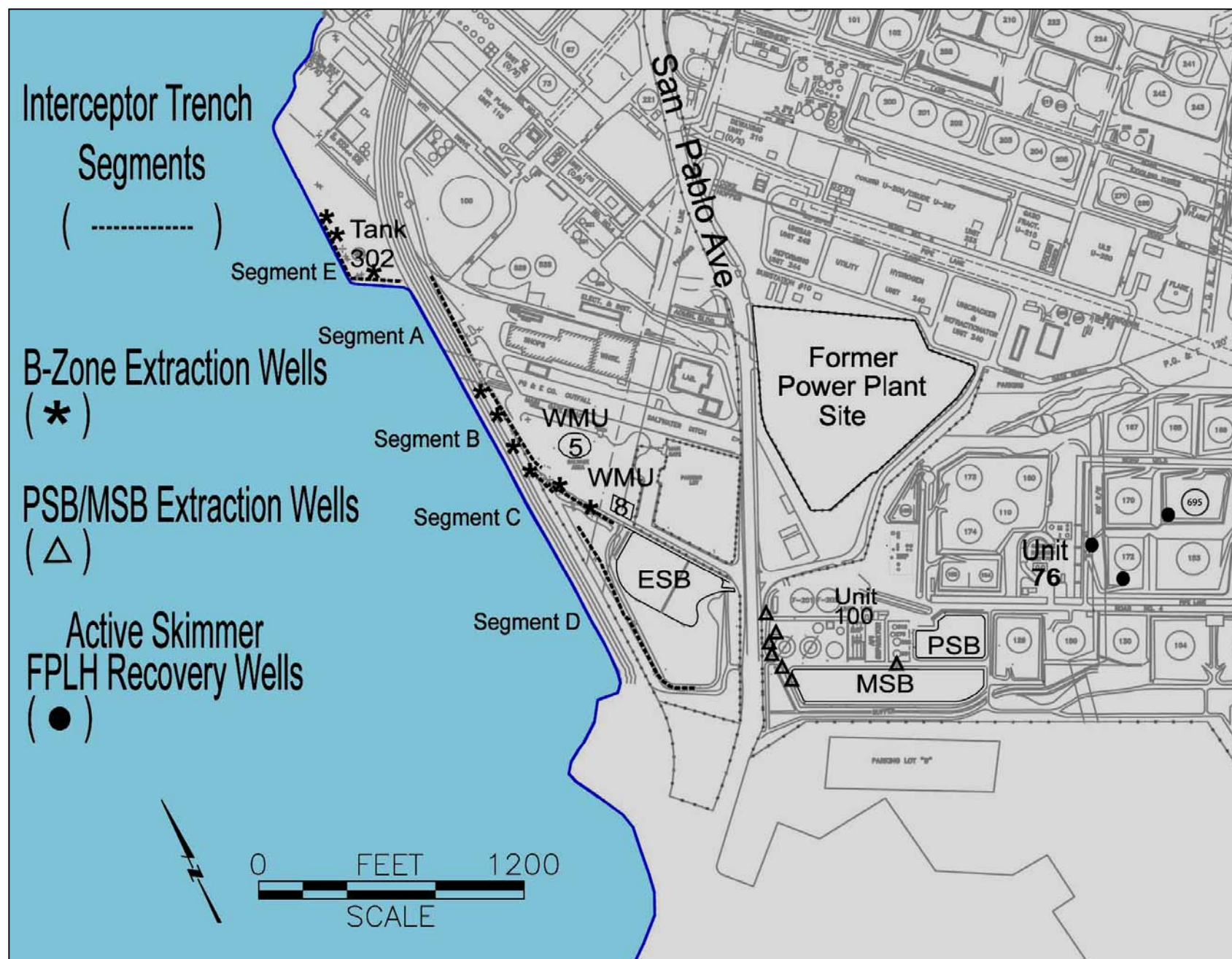
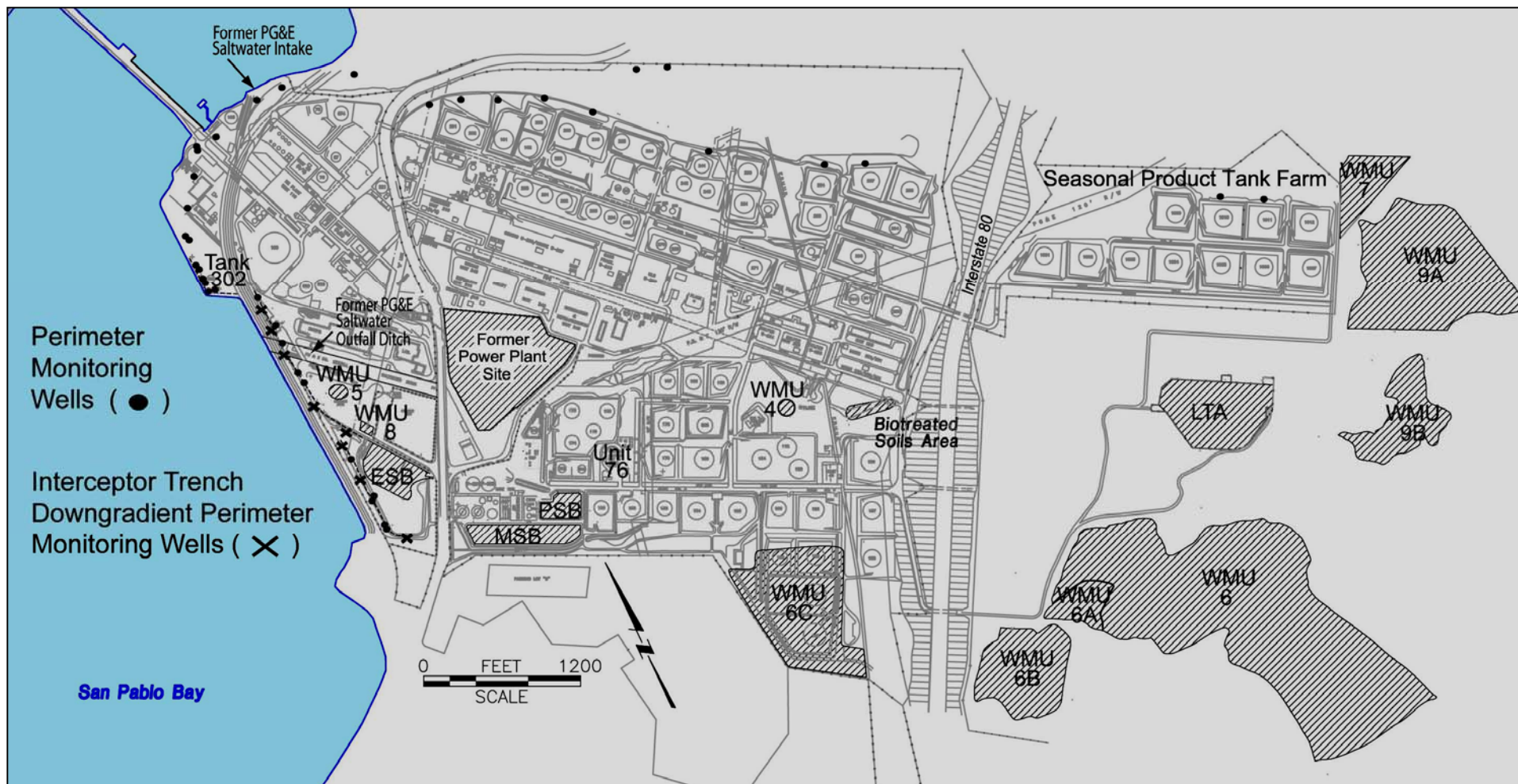


Figure 6. Perimeter Monitoring Wells (figure based on “Site Plan” map from MWH Site Monitoring Reports)



**CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION**

SELF-MONITORING PROGRAM

**FOR
CONOCOPHILLIPS COMPANY**

**SAN FRANCISCO REFINERY
1380 SAN PABLO AVE., RODEO, CA
CONTRA COSTA COUNTY**

ORDER NO. R2-2005-0026

CONSISTS OF

PART A

AND

PART B

PART A

A. AUTHORITY AND PURPOSE

For discharges of waste to land, water quality monitoring is required pursuant to the California Code of Regulations, Division 2, Title 27, Subdivision 1, Chapter 3, Subchapter 3, Sections 20380 through 20435. The principal purposes of a self-monitoring program (SMP) are:

1. To document compliance with waste discharge requirements and prohibitions established by the Water Board;
2. To facilitate self-policing by the waste Discharger in the prevention and abatement of pollution arising from the waste discharge;
3. To develop or assist in the development of effluent standards of performance, and toxicity standards;
4. To prepare water and wastewater quality inventories; and
5. To assist the Discharger in complying with the requirements of Title 27.

B. MONITORING REQUIREMENTS

Monitoring refers to the measurement and sampling of environmental media, the making of standard observations in and around waste management units (WMUs) and Class II surface impoundments (surface impoundments), the inspection of containment and control facilities, and the monitoring of waste disposed in each WMU or surface impoundment. Part B of this SMP indicates the specific types of monitoring required as well as the monitoring frequency and reporting schedule. The following defines the types of monitoring that shall be required.

1. Monitoring Environmental Media

The Water Board shall require monitoring of any of the following environmental media:

- a. Groundwater
- b. Surface water (streams, stormwater runoff, etc.)
- c. Soil/Sediment

Sample collection, storage, and analyses shall be performed according to the most recent version of EPA Standard Methods or in accordance with an approved sampling and analysis plan.

All required water and waste analyses shall be performed by a California State-approved laboratory. The director of the laboratory whose name appears on the certification shall supervise all analytical work in his/her laboratory and shall sign all reports of such work submitted to the Water Board.

All monitoring instruments and devices used to fulfill the prescribed SMP shall be properly maintained and calibrated as necessary to ensure their continued accuracy. All flow measurement devices shall be calibrated at least once per year, or more frequently, to ensure continued accuracy of the devices.

2. Definition of Terms

- a. Grab Sample

A grab sample is a discrete sample collected at any time.

b. Composite Sample

A composite sample is a sample composed of individual grab samples mixed in proportions varying not more than plus or minus five percent from the instantaneous rate of waste flow corresponding to each grab sample collected at regular intervals not greater than one hour, or collected by the use of continuous automatic sampling devices capable of attaining the proportional accuracy stipulated above throughout the period of discharge or 24 consecutive hours, whichever is shorter.

c. Receiving Waters

Receiving waters refers to any water that actually or potentially receives surface or groundwater that pass into, through, or under the WMUs or contaminated soils. The receiving waters are the groundwater beneath and adjacent to the WMUs, the surface runoff from the site, and the drainage ditches surrounding the site. San Francisco Bay or its subbasins or nearby streams into which water from the site discharges are considered receiving waters.

d. Standard Observations

Standard observations refer to observations within the limits of each WMU and surface impoundment, at their perimeter, and of the receiving waters beyond their limits. Standard observations include:

i. WMUs and surface impoundments:

- (1) Evidence of ponded water at any point on the WMU;
- (2) Evidence of odors, including their presence or absence, characterization, source, and distance of travel from the WMU or surface impoundment;
- (3) Evidence of algal or other unusual growth;
- (4) Precipitation of sludge or minerals, quantity, nature and chemical composition;
- (5) Evidence of erosion at a WMU or surface impoundment; and
- (6) Daylighted waste at a WMU.

ii. Perimeter of WMUs and surface impoundments:

- (1) Evidence of liquid leaving or entering the WMU or surface impoundment, estimated size of affected area and flow rate (show affected area on map);
- (2) Evidence of algal or other unusual growth;
- (3) Precipitation of sludge or minerals, quantity, nature and chemical composition;
- (4) Evidence of odors, including their presence or absence, characterization, source, and distance of travel from the WMU or surface impoundment;
- (5) Evidence of erosion at a WMU or surface impoundment; and
- (6) Daylighted waste at a WMU.

iii. Receiving Waters:

- (1) Floating and suspended materials of waste origin: including their presence or absence, source, and size of affected area;
- (2) Discoloration and turbidity: description of color, source, and size of affected area;
- (3) Evidence of odors, presence or absence, characterization, source, and distance of travel from source;

- (4) Evidence of beneficial use: presence of water associated with wildlife;
 - (5) Flow rate; and
 - (6) Weather conditions (wind direction and estimated velocity, total precipitation since last observation).
- iv. Facilities Inspections
- Facilities inspections refer to the inspection of all containment and control structures and devices associated with WMUs and surface impoundments. Containment and control facilities include the following:
- (1) Sedimentation Pond(s);
 - (2) Perimeter diversion channels;
 - (3) Soil and groundwater remediation systems.

C. REPORTING REQUIREMENTS

Reporting responsibilities of waste discharge are specified in Sections 13225(a), 13267(b), 13383, and 13387(b) of the California Water Code (CWC) and this Regional Water Board's Resolution No.73-16 and Title 27. The monitoring frequency and reporting schedule are indicated in Part B of this SMP. Each monitoring report shall include the following information:

1. Transmittal Letter

A letter transmitting essential points shall be included in each monitoring report. The Transmittal Letter (letter) shall include a discussion of the essential points contained in the self-monitoring report. This discussion shall include a summary of violations that occurred during the reporting period and actions taken or planned to correct the problem. If no violations have occurred in the last report period, this shall be stated. The letter shall also certify the completion of all monitoring requirements. The letter shall be signed by the Discharger's principal Executive Officer or his/her duly authorized representative, and shall include a statement by the official, under penalty of perjury, that the report is true and correct to the best of the official's knowledge (see Provision No. 28).

2. Compliance Evaluation Summary

Each Semiannual and/or Annual monitoring report shall include a compliance evaluation summary containing the following information:

- a. A summary and certification of completion of all environmental media monitoring, standard observations, and facilities inspections (Semiannual Reporting);
- b. A graphic demonstration (e.g., potentiometric surface contour maps) of hydraulic containment and/or separation from groundwater beneath and around the perimeter of WMUs and surface impoundments where required (Semiannual Reporting);
- c. Map(s) or aerial photograph(s) showing observation and monitoring station locations (Semiannual Reporting);
- d. A written discussion of groundwater analyses indicating any change in the quality of the groundwater. Increasing pollutant concentration trends as indicated by a non-parametric statistical trend analysis (such as a Mann-Kendall analysis) of concentration trends at the POC for any WMU or surface impoundment shall be noted and flagged, and any exceedance of Trigger Levels within any perimeter segment well shall be noted and flagged (Semiannual Reporting);

- e. A cover letter signed by the laboratory director whose name appears on the laboratory certification, indicating that he/she has supervised all analytical work in his/her laboratory (Semiannual Reporting);
- f. A graphic or tabular presentation, in conjunction with potentiometric contour surface maps, detailing the velocity and direction of groundwater flow under/around each WMU and surface impoundment. Data presentation shall be based upon the past and present water level elevations and pertinent visual observations and shall include a written discussion (Annual Report Only).

3. Appendices

Include the following information in appendices, unless the information is already contained in an approved Sampling and Analysis Plan. The appendices need not include the actual laboratory analytical data sheets and quality assurance/quality control (QA/QC) report summary, however, this information shall be provided upon request.

- a. New boring and well logs;
- b. Method and time of water level measurements;
- c. Purging methods and results including the type of pump used, pump placement in the well, pumping rate, equipment and methods used to monitor field pH, temperature, and conductivity, calibration of the field equipment, pH, temperature, conductivity, and turbidity measurements, well recovery time, and method of disposing of the purge water;
- d. Sampling procedures, field and travel blanks, number and description of duplicate samples, type of sample containers and preservatives used, the date and time of sampling, the name and qualifications of the person actually taking the samples, and any other relevant observations;
- e. Documentation of laboratory results, analytical methods, detection limits, and QA/QC procedures for the required sampling, including:
 - i. Laboratory statements of results of analyses;
 - ii. Descriptions of analytical methods used (Note: If methods other than EPA approved methods or Standard Methods are used, the exact methodology must be submitted for review and approval by the Executive Officer prior to use.);
 - iii. Actual detection limits for each sample results (**The methods of analyses and detection limits must be appropriate for the expected contaminants and concentrations**); and
 - iv. Laboratory QA/QC information and results including analytical methods, detection limits, recovery rates, explanations for low recovery rates (less than 80%), equipment and method blanks, spikes and surrogates, and QA/QC sample frequency.
- f. A non-parametric statistical analysis of concentration trends (Annual Report only).

D. ANNUAL REPORTING

The Discharger shall submit an annual self-monitoring report to the Water Board covering the previous calendar year. The annual report must summarize all monitoring, investigation, and remedial activities that have occurred in the previous year. The annual report shall include the following information **for each monitoring event during**

the year required pursuant to this SMP, in addition to the transmittal letter and appendices described in Sections C.1, C.2, and C.3 of this SMP:

1. Graphic Presentation

Include site maps (plot plans) for each aquifer or water-bearing zone monitored that are drawn to a scale that remains constant from reporting period to reporting period. Line or bar graphs are helpful to illustrate variations in groundwater elevations, phase-separated product thickness, and dissolved chemical concentrations with time. These maps and graphs shall include the following information:

- a. Known or probable contaminant sources;
- b. Well locations;
- c. Groundwater elevation contours;
- d. Inferred groundwater flow direction(s);
- e. Identify wells containing phase-separated product;
- f. Extent of dissolved chemical constituents presented in map layout (e.g., isoconcentration maps, chemical box data maps, etc.); and
- g. Appropriate analytical results.
- h. Geologic cross sections are required if new data is available and/or the previous interpretation of subsurface conditions has changed. When required, geologic cross sections shall include the following:
 - i. Vertical and lateral extent of contamination;
 - ii. Contaminant sources;
 - iii. Geologic structures;
 - iv. Soil lithology;
 - v. Water table/piezometric surfaces;
 - vi. Sample locations;
 - vii. Sample analytical results; and
 - viii. Subsurface utilities and any other potential natural or manmade conduits for contaminant migration.

2. Tabular Presentation

Present all of the following data in one or more tables to show a chronological history and allow quick and easy reference. The table(s) shall include the following information:

- a. Well designations;
- b. Well location coordinates (latitude and longitude);
- c. Well construction (including top of well casing elevation, total well depth, screen interval depth below ground surface, and screen interval elevation);
- d. Groundwater depths;
- e. Groundwater elevations;
- f. Horizontal groundwater gradients;
- g. Vertical groundwater gradients (including comparison wells from different zones);
- h. Phase-separated product elevations;
- i. Phase-separated product thickness;
- j. Current analytical results (including analytical method and detection limits for each constituent);

- k. Historical analytical results for the most recent four sampling events;
 - l. Measurement dates;
 - m. Groundwater extraction, including:
 - i. Average daily extraction rate;
 - ii. Total volume extracted for monitoring period; and
 - iii. Annual cumulative total volume extracted.
 - n. Estimate of contaminant volume extracted (reported in gallons) including:
 - i. Average daily removal rate;
 - ii. Total volume removed for monitoring period; and
 - iii. Annual cumulative total volume removed.
3. **Discussion**
- Provide a discussion of the field and laboratory results that includes the following information:
- a. Data Interpretations;
 - b. Conclusions;
 - c. Recommendations;
 - d. Newly implemented or planned investigations and remedial measures;
 - e. Data anomalies;
 - f. Variations from protocols;
 - g. Conditions of wells; and

E. CONTINGENCY REPORTING

1. The Discharger shall report by telephone to the Water Board, any discharge from the disposal area immediately after it is discovered. The Discharger shall submit a written report with the Water Board within five working days of discovery of any discharge. The written report shall contain the following information:
 - a. Nature of the waste or pollutant;
 - b. Estimate of the quantity involved;
 - c. Approximate rate of overflow;
 - d. Duration of incident;
 - e. Cause of the release;
 - f. Estimated size of affected area;
 - g. Corrective measures that have been taken or planned, and a schedule of these measures;
 - h. Nature of effects (e.g., pertinent observations, analyses, etc.);
 - i. The persons/agencies notified;
 - j. A map showing the location(s) of any discharge, seepage or dike rupture;
 - k. A photo of the impacted area as soon as possible after the discharge; and
 - l. A photo of the impacted area at the completion of clean up (this photograph may be supplied following submittal of the Release Report if cleanup requires more than five working days).
2. The Discharger shall submit a written report to the Water Board within seven working days of determining that a statistically significant difference occurred between a self-monitoring sample set and an approved WQPS or a trigger level exceedance in a

perimeter segment-monitoring well. The written report shall indicate what WQPS(s) have been exceeded. The Discharger shall immediately resample at the compliance point(s) where this difference has been found and analyze another sample set of at least four portions split in the laboratory from the source sample.

3. If re-sampling and analysis confirms the earlier finding of a statistically significant difference between self-monitoring results and WQPS(s) the Discharger shall submit to the Water Board an amended Report of Waste Discharge as specified in Title 27, Section 20420 for establishment of an Evaluation Monitoring program meeting the requirements of Title 27, Section 20425.
4. Within 180 calendar days of determining statistically significant evidence of a release, the Discharger shall submit to the Water Board an engineering feasibility study for a Corrective Action Plan (CAP) necessary to meet the requirements of Title 27, Section 20430. At a minimum, the feasibility study shall contain a detailed description of the corrective action measures that could be taken to achieve background concentrations for all COCs.

F. ELECTRONIC REPORTING

1. Geotracker Requirements

The State Board recently adopted regulations requiring electronic report and data submittal to Geotracker. The text of the regulations can be found at the following URL:

http://www.waterboards.ca.gov/ust/cleanup/electronic_reporting/docs/final_electronic_regs_dec04.pdf
Starting July 1, 2005, parties responsible for cleanup of pollution at sites overseen by the Regional Water Board's Land Disposal Programs are required to submit over the internet, the following information electronically:

- a. Groundwater analytical data;
- b. Surveyed locations of monitoring wells;
- c. Boring logs describing monitoring well construction; and
- d. Portable data format (PDF) copies of all reports (the document in its entirety [signature pages, text, figures, tables, etc.] must be saved as a single PDF file).

Note that the Discharger is still responsible for submitting one hard copy of all reports pursuant to this Order. Individual Regional Water Boards may require direct submittal of electronic reports and correspondence in addition to the State Board's Geotracker requirements.

2. Data Tables

Upon request, monitoring results shall also be provided electronically in Microsoft Excel® or similar spreadsheet format to provide an easy to review chronological summary of site data, and to facilitate data computations and/or plotting that Water Board staff may undertake during the review process. Data tables submitted in electronic spreadsheet format will not be included in the case file for public review and should therefore be submitted on CD or diskette and included with the print report.

Electronic tables shall include the following information:

- a. Well designations;
- b. Well location coordinates (latitude and longitude);
- c. Well construction (including top of well casing elevation, total well depth, screen interval depth below ground surface, and screen interval elevation);

- d. Groundwater depths and elevations (water levels);
- e. Phase-separated product thicknesses and elevations;
- f. Current analytical results by constituent of concern (including detection limits for each constituent);
- g. Historical analytical results (including the past four sampling events); and
- h. Measurement dates.

G. MAINTENANCE OF WRITTEN RECORDS

The Discharger shall maintain information required pursuant to this SMP for a **minimum of five years**. The five-year period of retention shall be extended during the course of any unresolved litigation regarding this discharge or when requested by the Water Board.

PART B

A. GROUNDWATER MONITORING

1. Groundwater samples shall be monitored at the following compliance points:
 - a. Seasonal Products Storage Tank Area;
 - b. Upper Tank Farm;
 - c. Lower Tank Farm (including Unit 76 Area);
 - d. Tank 302 / Well 181 Area;
 - e. Primary Storm Basin;
 - f. Main Storm Basin;
 - g. Effluent Safety Basin;
 - h. Perimeter Wells;
 - i. Inactive WMUs.
2. The Discharger shall sample groundwater from the extraction trench quarterly and include results in the facility Semiannual Report.

B. SURFACE WATER, STORMWATER, AND WASTEWATER MONITORING

The Discharger shall sample surface water, stormwater, and wastewater in surface impoundments if not completed as part of the facility's NPDES permit. Monitoring results shall be documented in the facility Annual Report. If these environmental media are not already monitored, the Discharger shall propose sampling frequency and analytes.

C. STANDARD OBSERVATIONS

Standard observations (Part A; Section B.2.d.) shall be made for all WMUs, interior monitoring areas, surface impoundments, and containment structures as noted in Section E, Table B.1. Violations must be reported to the Water Board immediately. An "exception only" summary of inspection results shall be documented in the facility Annual Report.

D. FACILITIES MONITORING

The Discharger shall inspect all facilities to ensure proper and safe operation once per week. Violations must be reported to the Water Board immediately. An "exception only" summary of inspection results shall be documented in the facility Annual Report. The facilities to be monitored shall include, but not be limited to:

1. General operation of the groundwater remediation systems;
2. Valves and piping, including wastewater transfer piping associated with the facility's groundwater remediation systems;
3. Exposed WMU liners or surface impoundment liners; and
4. Surface water perimeter diversion trenches or channels that may be impacted by releases from active and/or inactive WMUs.

Note: Summary discussion shall include "exception only" reporting.

E. FREQUENCY OF OBSERVATIONS

Table B.1

Location	Description	Frequency
Surface Impoundments	Standard observation of the Primary Storm Basin and Main Storm Basin as described in Part A; Section B.2.d.	Daily
Effluent Safety Basin	Standard observations as described in Part A; Section B.2.d.	Daily
E-003 Outfall Area	Monitor potential accumulation and release of petroleum hydrocarbons	Daily
Former PG&E Saltwater Intake	Monitor potential accumulation and release of petroleum hydrocarbons	Daily
Former PG&E Saltwater Outfall Ditch	Monitor potential accumulation and release of petroleum hydrocarbons	Daily
Unit 76 Active Skimmer Recovery System	Monitor hydrocarbon recovery and product accumulation in wells	Weekly
Inactive WMUs and Land Treatment Area	Standard observations as described in Part A; Section B.2.d.	Semiannual

F. REPORTING SCHEDULE

The Discharger shall submit self-monitoring reports per the schedule indicated in Table B2. Reports due at the same time may be combined into one report for convenience, provided monitoring activities and results pertaining to each monitoring period are clearly distinguishable.

Any potential or direct threats to water quality shall be reported immediately as outlined in Part A., Section E (Contingency Reporting).

Table B2. Reports and Due Dates

Report	Reporting Frequency	Period That Samples Are to be Collected	Report Due Date
Winter/Spring	First Semiannual	April / May	August 31 st
Summer/Fall	Second Semiannual / Annual Report	September / October	March 31 st

Note: The annual report shall be combined with the Discharger's Summer/Fall Second Semiannual report.

G. GROUNDWATER SELF-MONITORING PROGRAM (SMP)

Attached Table 2 provides a summary overview of the Groundwater Self-Monitoring Program. Attached Table 3 provides a detailed list of groundwater monitoring wells and corresponding sampling parameters for the current SMP.

I, Bruce H. Wolfe, Executive Officer, hereby certify that the foregoing Self-Monitoring Program:

- Has been developed in accordance with the procedures set forth in this Water Board's Resolution No. 73-16 in order to obtain data and document compliance with waste discharge requirements established in this Water Board's Order No. R2-2005-0026.
- Is effective on the date shown below.
- May be reviewed or modified at any time subsequent to the effective date, upon written notice from the Executive Officer.

Bruce H. Wolfe
Executive Officer

Date Ordered: June 15, 2005

Attachments: Table 2. Groundwater Monitoring Program Summary by Quarter
Table 3. Groundwater Monitoring Program Sampling Parameters
Table 4. Acronym List

TABLE 2
GROUNDWATER SELF-MONITORING PROGRAM SUMMARY BY QUARTER
CONOCOPHILLIPS SAN FRANCISCO REFINERY, RODEO

1st Quarter Jan.-Mar. (no report – data incl. in Semi Annual Rpt)	2nd Quarter Apr.-Jun. (Semi-Annual Report - due Aug 31)	3rd Quarter Jul.-Sept. (no report – data incl. in Annual Rpt)	4th Quarter Oct.-Dec. (Annual Report due Mar 31)
APSA Gauging	APSA Gauging	APSA Gauging	APSA Gauging
Sampling of Effluent from GW / FPLH Recovery Systems	Sampling of Effluent from GW / FPLH Recovery Systems	Sampling of Effluent from GW / FPLH Recovery Systems	Sampling of Effluent from GW / FPLH Recovery Systems
	Surface Impoundments (PSB/MSB) and ESB		Surface Impoundments (PSB/MSB) and ESB
	Refinery and Tormey GW Basin Perimeters		Refinery and Tormey GW Basin Perimeters
	Downgradient Trench Wells		Downgradient Trench Wells
	Former PG&E Power Plant Site		Former PG&E Power Plant Site
	Inactive WMUs 5 and 8		Inactive WMUs 4, 5, 6, 6A, 6B, 6C, 7, 8, 9A, 9B
			Annual gauging for Potentiometric surface map (site-wide)

Notes:

APSA = Aboveground Petroleum Storage Act
GW = Groundwater
FPLH = Free Phase Liquid Hydrocarbon
WMU = Waste Management Unit

PSB = Primary Storm Basin
MSB = Main Storm Basin
ESB = Effluent Safety Basin

TABLE 3
GROUNDWATER SELF-MONITORING PROGRAM SAMPLING PARAMETERS
CONOCOPHILLIPS SAN FRANCISCO REFINERY, RODEO

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	*Well No.	Area Monitored	Dissolved Antimony EPA 6010B	Dissolved Arsenic EPA 6010B	Dissolved Barium EPA 6010B	Dissolved Cadmium EPA 6010B	Dissolved Chromium EPA 6010B	Dissolved Lead EPA 6010B	Dissolved Mercury EPA 7470A	Nickel / Selenium / Vanadium / Aric EPA 6010B	Dissolved Nickel EPA 6010B	Dissolved Vanadium EPA 6010B	AVOCs + MTBE EPA 8260B	TPH-D EPA 3630C/ 8015M	VOCs EPA 8260B	SVOCs EPA 8270C	pH ⁹ EPA 9040B	PCBs EPA 8082
1	EEl-21	PSB / MSB	--	SA	SA	--	A	--	--	--	--	--	SA	SA	--	SA ^a	--	--
2	MW-24	PSB	--	SA	SA	--	A	--	--	--	--	--	SA	SA	--	SA ^b	--	--
3	MW-27	PBS	--	SA	SA	--	A	--	--	--	--	--	SA	SA	--	SA ^a	--	--
4	MW-9R	MSB	--	SA	SA	--	A	--	--	--	--	--	SA	SA	--	SA ^a	--	--
5	MW-16	MSB	--	SA	SA	--	A	--	--	--	--	--	SA	SA	--	SA ^a	--	--
6	MW-22	ESB	--	SA	SA	--	A	SA	A	--	--	--	--	SA	SA	SA ^a	--	--
7	MW-158	ESB / RGBP	--	SA	SA	--	A	SA	A	--	--	--	--	SA	SA	SA ^a	--	--
8	MW-165	ESB / RGBP	--	SA	SA	--	A	SA	A	--	--	--	--	SA	SA	SA ^a	--	--
9	MW-4-8	WMU 4	--	--	--	--	--	BA	--	--	--	--	A	A	--	A ^a	--	--
10	MW-4-9	WMU 4	--	--	--	--	--	BA	--	--	--	--	A	A	--	A ^a	--	--
11	MW-4-10	WMU 4	--	--	--	--	--	BA	--	--	--	--	A	A	--	A ^a	--	--
12	EEl-8	WMU 5, 8 / RGBP ^c	--	SA	SA	SA	SA	SA	--	--	--	--	--	--	SA	SA	SA	--
13	EEl-10	WMU 5, 8 / RGBP ^c	--	SA	SA	SA	SA	SA	--	--	--	--	--	--	SA	SA	SA	--
14	MW-2B	WMU 5, 8 / RGBP ^c	--	SA	SA	SA	SA	SA	--	--	--	--	--	--	SA	SA	SA	--
15	MW-6	WMU 5, 8 / RGBP ^c	--	SA	SA	SA	SA	SA	--	--	--	--	--	--	SA	SA	SA	--
16	MW-157	WMU 5, 8 / RGBP ^c	--	SA	SA	SA	SA	SA	--	--	--	--	--	--	SA	SA	SA	--
17	MW-6-35	WMU 6, 6A, 6B	--	--	--	--	--	A	BA	--	--	--	A	A	--	A ^a	--	--
18	MW-6-36	WMU 6, 6A, 6B	--	--	--	--	--	A	BA	--	--	--	A	A	--	A ^a	--	--
19	MW-6A-1	WMU 6, 6A, 6B	--	--	--	--	--	A	BA	--	--	--	A	A	--	A ^a	--	--
20	MW-6B-1	WMU 6, 6A, 6B	--	--	--	--	--	A	BA	--	--	--	A	A	--	A ^a	--	--
21	MW-6B-3	WMU 6, 6A, 6B	--	--	--	--	--	A	BA	--	--	--	A	A	--	A ^a	--	--
22	MW-6B-2	WMU 6, 6A, 6B, 6C	--	--	--	--	--	A	A	--	--	--	A	A	--	A ^a	--	--
23	MW-137	WMU 6C	--	--	--	--	--	A	A	--	--	--	A	A	--	A ^b	--	--
24	MW-138	WMU 6C	--	--	--	--	--	A	A	--	--	--	A	A	--	A ^b	--	--
25	MW-139	WMU 6C	--	--	--	--	--	A	A	--	--	--	A	A	--	A ^a	--	--
26	MW-211	WMU 6C	--	--	--	--	--	A	A	--	--	--	A	A	--	A ^a	--	--

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	*Well No.	Area Monitored	Dissolved Antimony EPA 6010B	Dissolved Arsenic EPA 6010B	Dissolved Barium EPA 6010B	Dissolved Cadmium EPA 6010B	Dissolved Chromium EPA 6010B	Dissolved Lead EPA 6010B	Dissolved Mercury EPA 7470A	Nickel / Selenium / Vanadium / Anic EPA 6010B	Dissolved Nickel EPA 6010B	Dissolved Vanadium EPA 6010B	AVOCs + MTBE EPA 8260B	TPH-D EPA 3630C/ 8015M	VOCs EPA 8260B	SVOCs EPA 8270C	pH ⁹ EPA 9040B	PCBs EPA 8082
27	MW-7-26	WMU 7	--	A	A	--	BA	A	--	--	--	--	--	--	--	A	--	--
28	MW-7-27	WMU 7	--	A	A	--	BA	A	--	--	--	--	--	--	--	A	--	--
29	MW-7-28	WMU 7	--	A	A	--	BA	A	--	--	--	--	--	--	--	A	--	--
30	MW-9A-1	WMU 7, 9A, 9B	--	A	A	--	BA	A	A	--	--	--	A	A	--	A	--	--
31	MW-9A-3	WMU 9A, 9B	--	--	--	--	BA	A	BA	--	--	--	A	A	--	A ^a	--	--
32	MW-9A-4	WMU 9A, 9B	--	--	--	--	BA	A	BA	--	--	--	A	A	--	A ^a	--	--
33	MW-9B-1	WMU 9A, 9B	--	--	--	--	BA	A	BA	--	--	--	A	A	--	A ^a	--	--
34	MW-9B-2	WMU 9A, 9B	--	--	--	--	BA	A	BA	--	--	--	A	A	--	A ^a	--	--
35	EEL-11	RGBP ^d	--	--	--	--	--	SA	--	--	--	--	SA	SA	--	--	--	--
36	EEL-13	RGBP ^d	--	--	--	--	--	SA	--	--	--	--	SA	SA	--	--	--	--
37	MW-146R	RGBP ^d	--	--	--	--	--	SA	--	--	--	--	SA	SA	--	--	--	--
38	MW-148	RGBP ^d	--	--	--	--	--	SA	--	--	--	--	SA	SA	--	--	--	--
39	MW-150	RGBP ^d	--	--	--	--	--	SA	--	--	--	--	SA	SA	--	--	--	--
40	MW-155	RGBP ^d	--	--	--	--	--	SA	--	--	--	--	SA	SA	--	--	--	--
41	MW-172	RGBP ^d	--	--	--	--	--	SA	--	--	--	--	SA	SA	--	--	--	--
42	MW-177	RGBP ^d	--	--	--	--	--	SA	--	--	--	--	SA	SA	--	--	--	--
43	MW-178	RGBP ^d	--	--	--	--	--	SA	--	--	--	--	SA	SA	--	--	--	--
44	MW-179	RGBP ^d	--	--	--	--	--	SA	--	--	--	--	SA	SA	--	--	--	--
45	MW-180	RGBP ^d	--	--	--	--	--	SA	--	--	--	--	SA	SA	--	--	--	--
46	MW-181	RGBP ^d	--	--	--	--	--	SA	--	--	--	--	SA	SA	--	--	--	--
47	MW-196	RGBP ^d	--	--	--	--	--	SA	--	--	--	--	SA	SA	--	--	--	--
48	MW-197	RGBP ^d	--	--	--	--	--	SA	--	--	--	--	SA	SA	--	--	--	--
49	MW-198	RGBP ^d	--	--	--	--	--	SA	--	--	--	--	SA	SA	--	--	--	--
50	MW-199	RGBP ^d	--	--	--	--	--	SA	--	--	--	--	SA	SA	--	--	--	--
51	MW-159	RGBP ^e	--	SA	SA	--	BA	SA	BA	--	--	--	--	SA	SA	SA ^a	--	--
52	MW-160	RGBP ^e	--	SA	SA	--	BA	SA	BA	--	--	--	--	SA	SA	SA ^b	--	--
53	MW-161	RGBP ^e	--	SA	SA	--	BA	SA	BA	--	--	--	--	SA	SA	SA ^a	--	--
54	MW-166	RGBP ^e	--	SA	SA	--	BA	SA	BA	--	--	--	--	SA	SA	SA ^a	--	--

Self-Monitoring Program
WDR - ConocoPhillips San Francisco Refinery
Page 56

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	*Well No.	Area Monitored	Dissolved Antimony EPA 6010B	Dissolved Arsenic EPA 6010B	Dissolved Barium EPA 6010B	Dissolved Cadmium EPA 6010B	Dissolved Chromium EPA 6010B	Dissolved Lead EPA 6010B	Dissolved Mercury EPA 7470A	Nickel / Selenium / Vanadium / Anic EPA 6010B	Dissolved Nickel EPA 6010B	Dissolved Vanadium EPA 6010B	AVOCs + MTBE EPA 8260B	TPH-D EPA 3630C/ 8015M	VOCs EPA 8260B	SVOCs EPA 8270C	pH ⁹ EPA 9040B	PCBs EPA 8082
55	MW-188	RGBP ^f	--	--	--	--	--	SA	--	--	--	--	SA	SA	--	--	--	--
56	MW-189	RGBP ^f	--	--	--	--	--	SA	--	--	--	--	SA	SA	--	--	--	--
57	MW-190	RGBP ^f	--	SA	SA	SA	A	SA	--	--	--	--	--	--	SA	SA	SA	--
58	MW-191	RGBP ^f	--	SA	SA	SA	A	SA	--	--	--	--	--	--	SA	SA	SA	--
59	MW-192	RGBP ^f	--	SA	SA	SA	A	SA	--	--	--	--	--	--	SA	SA	SA	--
60	MW-193	RGBP ^f	--	SA	SA	--	A	SA	SA	--	--	--	--	--	SA	SA	--	--
61	MW-194	RGBP ^f	--	SA	SA	--	A	SA	SA	--	--	--	--	--	SA	SA	--	--
62	MW-195	RGBP ^f	--	SA	SA	--	A	SA	SA	--	--	--	--	--	SA	SA	--	--
63	MW-103	TGBP	--	SA	SA	--	BA	SA	--	--	--	--	SA	SA	--	SA ^a	--	--
64	MW-104	TGBP	--	SA	SA	--	BA	SA	--	--	--	--	SA	SA	--	SA ^a	--	--
65	MW-120	TGBP	--	--	--	--	--	SA	--	--	--	--	SA	SA	--	--	--	--
66	MW-121	TGBP	--	--	--	--	--	SA	--	--	--	--	SA	SA	--	SA ^a	--	--
67	MW-123	TGBP	--	--	--	--	--	SA	--	--	--	--	SA	SA	--	SA ^a	--	--
68	MW-124	TGBP	--	--	--	--	--	SA	--	--	--	--	SA	SA	--	SA ^a	--	--
69	MW-125	TGBP	--	--	--	--	--	SA	--	--	--	--	SA	SA	--	SA ^a	--	--
70	MW-126	TGBP	--	--	--	--	--	SA	--	--	--	--	SA	SA	--	SA ^a	--	--
71	MW-127	TGBP	--	--	--	--	--	SA	--	--	--	--	SA	SA	--	SA ^a	--	--
72	MW-129	TGBP	--	--	--	--	--	SA	--	--	--	--	SA	SA	--	SA ^a	--	--
73	MW-144	TGBP	--	--	--	--	--	SA	--	--	--	--	SA	SA	--	SA ^a	--	--
74	MW-173	TGBP	--	--	--	--	--	SA	--	--	--	--	SA	SA	--	SA ^a	--	--
75	MW-174	TGBP	--	--	--	--	--	SA	--	--	--	--	SA	SA	--	SA ^a	--	--
76	MW-175	TGBP	--	--	--	--	--	SA	--	--	--	--	SA	SA	--	SA ^a	--	--
77	MW-183	TGBP	--	--	--	--	--	SA	--	--	--	--	SA	SA	--	SA ^a	--	--
78	R00W001	PG&E OPP	SA	SA	--	--	SA	SA	--	--	SA	SA	--	SA	--	SA ^a	--	--
79	R00W002	PG&E OPP	SA	SA	--	--	SA	SA	--	--	SA	SA	--	SA	SA	SA	--	SA
80	R00W003	PG&E OPP	A	A	--	--	A	A	--	--	A	A	--	A	A	A ^a	--	--
81	R00W008	PG&E OPP	SA	SA	--	--	SA	SA	--	--	SA	SA	--	SA	--	SA ^a	--	--
82	R00W009	PG&E OPP	A	A	--	--	A	A	--	--	A	A	--	A	A	A ^a	--	--
83	R00W010	PG&E OPP	A	A	--	--	A	A	--	--	A	A	--	A	A	A ^a	--	--
84	R00W011	PG&E OPP	SA	SA	--	--	SA	SA	--	--	SA	SA	--	SA	--	SA ^a	--	--
85	R00W012	PG&E OPP	SA	SA	--	--	SA	SA	--	--	SA	SA	--	SA	--	SA ^a	--	--
86	R00W013	PG&E OPP	SA	SA	--	--	SA	SA	--	--	SA	SA	--	SA	SA	SA	--	SA

Notes:

- ^a Sample will be analyzed for SVOCs by EPA 8270 if TPH-D detected at >2.0 mg/L.
- ^b Sample will be extracted and held for analysis. Sample will be analyzed for SVOCs by EPA 8270C if TPH-D detected at >2.0 mg/L.
- ^c Wells located between the PG&E Discharger Channel and the ESB Discharge Channel.
- ^d Wells located north of the PG&E Discharge Channel.
- ^e Wells located south of the ESB Discharge Channel.
- ^f Wells located downgradient of the interceptor trench.
- ^g All samples field analyzed for pH.
- * Samples shall be analyzed for full suite of COCs once every five years

WMU	=	Waste Management Unit
TGBP	=	Tormey Groundwater Basin Perimeter
RGBP	=	Refinery Groundwater Basin Perimeter
PSB	=	Primary Storm Basin
MSB	=	Main Storm Basin
ESB	=	Effluent Safety Basin
PG&E OPP	=	Pacific Gas and Electric Oleum Power Plant
SA	=	Semi-Annual Sampling (May and November of each calendar year)
A	=	Annual Sampling (May of each calendar year)
BA	=	Biennial Sampling (even numbered years)

Table 4. Acronym List

µg/L	Microgram per Liter (part per billion, typically in water)
µS/cm	Micro-Siemens per Centimeter (units of electrical conductivity)
A	Annual Sampling (May of each calendar year)
APSA	Aboveground Petroleum Storage Act
AVOC	Aromatic Volatile Organic Compounds
BA	Biennial Sampling (even numbered years)
BTEX	Benzene, Toluene, Ethylbenzene, and Xylene
CAM	California Assessment Metals
CAP	Corrective Action Plan
CCR	California Code of Regulations
CD	Compact Disk
CLs	Concentration Limits
COC	Constituents of Concern
CSU	Container Storage Unit
CWC	California Water Code
DMP	Detection Monitoring Program
DTSC	Department of Toxic Substances Control
DUP	Duplicate
EPA	Environmental Protection Agency
ESB	Effluent Safety Basin
ESLs	Environmental Screening Levels
FPLH	Free-Phase Liquid Hydrocarbon
gpm	Gallons per Minute
GW	Groundwater
H&SC	Health and Safety Code
LTA	Land Treatment Area
MCL	Maximum Contaminant Level
mg/kg	Milligram per Kilogram (part per million, typically in soil)
mg/L	Milligram per Liter (part per million, typically in water)
MSB	Main Storm Basin
MTBE	Methyl Tertiary-Butyl Ether
MUN	municipal
MW	Monitoring Well
NPDES	National Pollutant Discharge Elimination System
OES	Office of Emergency Services
PAHs	Polynuclear Aromatic Hydrocarbons
PCBs	Poly Chlorinated Biphenyls
PDF	Portable Document Format
PG&E	Pacific Gas and Electric
PG&E OPP	Pacific Gas and Electric Oleum Power Plant
POC	Point of Compliance
PSB	Primary Storm Basin
QA/QC	Quality Assurance / Quality Control
RCRA	Resource Conservation and Recovery Act
RGBP	Refinery Groundwater Basin Perimeter
SA	Semi-Annual Sampling (May and November of each calendar year)
SCR	Site Cleanup Requirements
SMP	Self-Monitoring Program

SVOC	Semi-volatile Organic Compounds
SWAT	Solid Waste Assessment Test
TCLP	Toxicity Characteristic Leaching Procedure
TGBP	Tormey Groundwater Basin Perimeter
TPH	Total Petroleum Hydrocarbon
TPH-D	Total Petroleum Hydrocarbon - Diesel
VOC	Volatile Organic Compounds
WDR	Waste Discharge Requirements
WET	Waste Extraction Test
WMU	Waste Management Unit
WQPS	Water Quality Protection Standard